

University of Alberta

Sharps Injuries in Alberta Home Care Nurses

by

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A thesis submitted to the Faculty of Graduate Studies and Research
in partial fulfillment of the requirements for the
degree of Master of Nursing

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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research for acceptance, a thesis entitled *Sharps Injuries in Alberta Home Care Nurses* in partial fulfillment of the requirements for the degree of Master of Nursing.



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ABSTRACT

This study used a descriptive correlational survey design to describe the incidence of and factors related to sharps injuries sustained by home care nurses and to examine the relationship between recapping, disposal, and transportation of used sharps and sharps injuries. A structured, fixed alternative questionnaire was mailed to all home care nurses who provide direct care to clients in Alberta .

Of the 543 nurses who responded, 15% (n=82) had sustained a sharps injury in the preceding year, primarily when recapping needles and manipulating lancets. Contextual factors implicated most frequently were being rushed and having to assume awkward positioning. Using the Chi-square statistic, a significant relationship was found between sharps injuries and recapping needles, removing lancets from holders, and sharing a nursing bag with colleagues. Sharps injuries were also related to the nurses' concerns about contracting HIV and HCV infection and to selected policies regarding sharps injuries.

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TABLE OF CONTENTS

Chapter	Page
I. INTRODUCTION AND STATEMENT OF THE PROBLEM.....	1
A. PURPOSE OF THE STUDY.....	4
1. Research Questions.....	4
B. DEFINITION OF TERMS.....	5
II. A REVIEW OF THE LITERATURE.....	7
A. THE EXTENT AND CONSEQUENCES OF SHARPS INJURY.....	7
1. The Incidence of Sharps Injury.....	7
2. The Consequences of Sharps Injury.....	9
B. POST-EXPOSURE MANAGEMENT OF SHARPS INJURY.....	12
C. PREVENTING SHARPS INJURY.....	16
1. Recapping, Disposal, and Transportation Behaviors Related to Sharp Injury.....	16
2. Perception of Risk.....	21
3. Engineering Safer Devices or Substituting Non-Invasive Procedures.....	23
4. Organizational Approaches.....	29
5. Studies of Community-based Nurses.....	32
III. METHOD.....	35
A. SAMPLE.....	36
1. Sample Selection.....	36
2. Sample Design.....	37
3. Sample Size.....	39
B. DATA COLLECTION INSTRUMENT.....	41
1. Questionnaire Construction.....	41
2. Pre-Test of Instrument.....	43
3. Internal Consistency of the Questionnaire.....	44
4. Content Validity of the Questionnaire.....	45
C. DATA COLLECTION.....	45
D. DATA ANALYSIS.....	48
E. ETHICAL CONSIDERATIONS.....	52
IV. RESULTS.....	55
A. CHARACTERISTICS OF RESPONDENTS.....	55

B. BEHAVIORS, ATTITUDES, AND STRUCTURAL FACTORS RELATED TO PREVENTION OF SHARPS INJURY.....	58
1. Hepatitis B Immunization Status.....	58
2. Frequency of Procedures.....	60
3. Policies and Procedures Regarding Sharps Injuries.....	62
4. Home Care Nurses' Perception of Susceptibility.....	65
5. Environmental Risks in the Home.....	69
6. Recapping Behaviors.....	71
7. Disposal Behaviors.....	72
8. Transportation Behaviors.....	74
C. SHARPS INJURIES INCURRED BY NURSES.....	76
1. Time of Occurrence of Sharps Injury.....	77
2. Reporting of Sharps Injury.....	77
3. Activities Related to the Occurrence of Sharps Injury.....	79
4. Incidence of Sharps Injury.....	79
5. Contextual Factors Related to Sharps Injury.....	81
D. RELATIONSHIP BETWEEN SHARPS INJURIES AND SELECTED FACTORS	82
1. Sharps Injury by Respondent Characteristics	82
2. Policies and Sharps Injury.....	82
3. Perceived Risk and Sharps Injury.....	86
4. Sharps Injury and Recapping Behaviors.....	90
5. Sharps Injury and Disposal Behaviors.....	94
6. Sharps Injury and Transportation Behaviors.....	98
V. DISCUSSION.....	101
A. DESCRIPTION OF SHARPS INJURIES IN HOME CARE NURSES.....	101
1. Recapping of Used Sharps.....	104
2. Disposal of Used Sharps.....	107
3. Transportation of Used Sharps	108
4. Other Factors Related to Sharps Injury.....	109
B. LIMITATIONS OF THE STUDY.....	116
C. RECOMMENDATIONS FOR FUTURE STUDY.....	118
D. IMPLICATIONS FOR NURSING PRACTICE.....	119
REFERENCES.....	124
APPENDIX A: Covering Letter.....	140
APPENDIX B: Questionnaire.....	142

APPENDIX C: Reminder Letter.....	154
APPENDIX D: Permission from Authors	155
APPENDIX E: Ethical Approval.....	157

LIST OF TABLES

TABLE	DESCRIPTION	PAGE
1.	Education and Time of Graduation of Respondents.....	56
2.	Level of Education by Years Worked in Nursing.....	57
3.	Hepatitis B Immunization.....	60
4.	Number of Procedures Performed Weekly.....	61
5.	Purpose of Reporting Sharps Injuries in Agency.....	62
6.	Policies Related to Sharps Injury.....	64
7.	Perceived Susceptibility to HBV and HCV.....	66
8.	Perceived Susceptibility to HIV.....	68
9.	Environmental Factors in the Home.....	70
10.	Frequency of Recapping Behaviors.....	72
11.	Frequency of Disposal Behaviors.....	74
12.	Frequency of Transportation Behaviors.....	76
13.	Frequency of Sharps Injury in Past 12 Months.....	77
14.	Reasons Given for not Reporting Sharps Injuries.....	78
15.	Activities Performed at Time of Sharps Injury.....	79
16.	Contextual Factors in the Home Setting.....	81
17.	Relationship between Policies and Sharps Injury.....	84
18.	Perceived Risk of HBV or HCV and Sharps Injury.....	87
19.	Perceived Risk of HIV and Sharps Injury.....	89
20.	Relationship between Recapping Behaviors and Sharps Injury...	90
21.	Relationship between Recapping and Sharps Injury using Dichotomous Variables.....	93
22.	Relationship between Disposal Behaviors and Sharps Injury.....	95
23.	Relationship between Disposal and Sharps Injury using Collapsed Variables.....	97
24.	Relationship between Transportation Behaviors and Sharps Injury.....	98
25.	Relationship between Transportation and Sharps Injury using Dichotomous Variables.....	99
26.	Relationship between Transportation and Sharps Injury using Collapsed Variables.....	100

LIST OF FIGURES

FIGURE	DESCRIPTION	PAGE
1.	Average Number of Hours Worked Weekly.....	58

CHAPTER I

INTRODUCTION AND STATEMENT OF THE PROBLEM

Nurses are at risk of acquiring infections in the workplace (Hersey & Martin, 1994; McCormick & Maki, 1981; Williamson et al., 1988). Bloodborne infections may be transmitted occupationally through parenteral exposure, mucous membrane exposure, and exposure through non-intact skin (Centers for Disease Control [CDC], 1989). A penetrating injury from an infected person constitutes the greatest occupational risk for transmitting a bloodborne infection (CDC, 1989; Polish, Tong, Co, Coleman, & Alter, 1993). While many infections are transmitted potentially through a sharps injury, hepatitis B virus (HBV), hepatitis C virus (HCV), and human immunodeficiency virus (HIV) are the most consequential (Gerberding & Henderson, 1992; Lanphear, 1994).

McCormick and Maki (1981) were the first to describe the factors related to sharps injuries sustained by hospital personnel. They concluded that most sharps injuries were caused by the improper disposal and recapping of used needles. Nurses handle more used needles than any other group of health care workers and are, therefore, at greatest risk of sharps injuries. Studies demonstrate consistently that

nearly two thirds of all sharps injuries in hospitals are sustained by nurses (Bowden, Pollett, Birrell, & Dax, 1993; Dalton et al., 1992; Haiduven, DeMaio, & Stevens, 1992; Henderson et al., 1990; McCormick, Meisch, Ircink, & Maki, 1991; Ruben, Norden, Rockwell, & Hruska, 1983).

Smith and White (1993) claim the risk for sharps injuries in nurses working in institutional settings is well delineated. By contrast, the risk for nurses working in the community has only been described in two studies (Skillen, 1992; White & Smith, 1993). In an organizational analysis of work hazards of public health nurses, Skillen (1992) found that 10 in her sample of 57 nurses sustained a sharps injury within the preceding 12 months. Skillen (1992) acknowledged that some of the sharps injuries may have resulted from recapping but questioned whether organizational factors may have contributed to the injuries.

White and Smith (1993) conducted a survey for the purpose of describing characteristics of home care agencies, including the existence of policies for infection control. All from responding agencies reported that there were established policies for the handling and disposal of used sharps. However, the relatively low response (33%) suggests that these findings may not be representative of home care agencies.

As the delivery of services provided in the home grows rapidly and the types of services become increasingly complex and invasive (White, 1992), the need to establish the incidence of sharps injuries and the related factors in this setting becomes more urgent. In an environment which is unpredictable and less controlled, there may be increased opportunities for home care nurses to sustain sharps injuries, in addition to those that are encountered by their colleagues working in institutional settings (Smith & White, 1993). Inadequate lighting, working alone, unsuitable furniture used as makeshift work surfaces, cramped working space necessitating awkward positioning to provide care, and the conveyance of used sharps to a vehicle for subsequent disposal may all be factors that augment the risk (Skillen, 1992).

Further, as the prevalence of HIV, and possibly HBV, increases in the population, the risk of occupational exposure to these infections also increases (Gerberding, 1990; Kopfer & McGovern, 1993). Home care nurses are more likely to care for AIDS clients who are dying. These terminally ill clients will probably have high levels of HIV circulating in their blood during the end stage of their immunosuppressive illness (CDC, 1994a). There is evidence to suggest that an elevated titer of HIV in blood may be an important predictor of infectivity from a sharps

injury (CDC, 1994a; Mast, Woolwine, & Gerberding, 1993).

The frequency of, and factors that lead to, sharps injuries in home care nurses have not been thoroughly studied. The results of this study may lead to improved control and decreased transmission of bloodborne infections in the workplace.

Purpose of the Study

The purpose of this study is to describe the incidence of and factors related to sharps injuries sustained by home care nurses in Alberta.

Research questions:

1. What is the incidence of sharps injuries in home care nurses in Alberta?
2. Is there a relationship between recapping and sharps injuries sustained by home care nurses?
3. Is there a relationship between disposal of the used sharp and sharps injuries sustained by home care nurses?
4. Is there a relationship between transporting used sharps from the home and sharps injuries sustained by home care nurses?
5. What are the other factors related to sharps injuries sustained by home care nurses?

Definition of Terms

Sharps injury: A penetrating injury of the skin by a used needle or other sharp instrument, such as a lancet, that is potentially contaminated with another individual's blood or body fluids.

Recapping

Two-handed: Resheathing the needle by holding the plastic cover in one hand and placing the needle and syringe that is held in the other hand back into the plastic needle cover after the needle has been used.

One-handed: Using one hand to spear the small-diameter, plastic cover, in which the needle was packaged originally, back onto the needle after it has been used to administer an injection or take a specimen from a client.

Recapping device: A plastic, shield-shaped device which securely holds the cap of a needle.

Disposing sharps: Handling a sharps device after it has been used on a client until it is deposited in a

disposal container.

Transporting Used

Sharps:

The conveyance of used sharps from the client's home to the dumping site.

CHAPTER II

REVIEW OF THE LITERATURE

A review of the literature was conducted to shape the focus of this study. The review begins with an overview of the extent and consequences of sharps injuries, followed by a discussion of the post-exposure management of nurses who sustain sharps injuries. The major section of the literature review describes studies related to activities surrounding sharps injuries and efforts to prevent injuries. In conducting this literature review, the following databases were reviewed: Nursing and Allied Health (CINAHL) from 1982 to October 1995, Health Planning and Administration (Health) from 1975 to November 1995, and Medline from 1976 to December 1995.

The Extent and Consequences of Sharps Injury

The Incidence of Sharps Injury

McCormick and Maki (1981) concluded that most sharps injuries were reported by nurses. Surveillance studies show approximately two thirds of all reported sharps injuries occur in nurses (Bowden et al., 1993; Dalton et al., 1992; English, 1992; Haiduven et al., 1992; Mallon, Shearwood, Mallal, French, & Dawkins, 1992; McCormick et al., 1991; Rowe & Giuffre, 1991; Ruben et al., 1983; Weatherly, Young,

& Andresky, 1991). While the absolute number of sharps injuries is reportedly higher in nurses, the actual rate of occurrence may be higher in physicians (deVries & Cossart, 1994; Mercier 1994, Stotka, Wong, Williams, Stuart, & Markowitz, 1991). Summarizing the data from prospective studies of sharps injuries, Robert and Bell (1994) report a rate of 1.8 per year for physicians and 0.98 for nurses working on the same medical wards.

Although the rate of sharps injuries is higher in physicians than in nurses, twice as many nurses have been reported with occupationally-acquired HIV infection (Jagger, 1994a). In 1994, CDC was following 123 health care workers in the United States who had definitely or possibly acquired HIV infection occupationally (Jagger, 1994a). Of this number, the three highest occupational groups represented are nurses and laboratory workers (each comprising 24% of possible seroconversions), followed by physicians (12%).

The lower number of HIV infections in physicians may be a result of several factors. First, there are more nurses than physicians working in health care. As well, physicians' injuries are more likely to be caused by suture needles, which are believed to be less efficient in transmitting infection than hollow-bore needles (Bennett & Howard, 1994).

Physicians also may be more likely to be wearing gloves when their exposure occurs; wearing gloves may reduce the volume of blood introduced through the injury by more than half (Mast et al., 1993). Finally, physicians may be reluctant to report sharps injuries, fearing restrictions on their practice (Lanphear, 1994).

The under-reporting of sharps injuries was first described in a retrospective study by Hamory (1983), who estimated that 40% of sharps injuries in the previous three months and 75% in the last year had not been reported by employees at a university hospital. Under-reporting has been described by other researchers (Jackson, Dechairo, & Gardner, 1986; deVries & Cossart, 1994; McGeer, Simor, & Low, 1990; Skillen, 1992). Jagger and Balon (1995) state that sharps injuries occurring in the operating room are the least likely of any to be reported. Despite the educational efforts of the last decade to encourage reporting of sharps injuries, Roy and Robillard (1995) estimated that an alarming 69.6% of sharps injuries from five hospitals were not reported. The true magnitude of sharps injuries may be even more seriously underestimated in the unstructured setting of home care nursing.

The Consequences of Sharps Injuries

HBV is the major infectious threat in health care settings (Kane

1993). Health care workers who have a significant exposure to HBV but who have not previously received hepatitis B vaccine and do not receive post-exposure prophylaxis have a 6% to 30% risk of becoming infected (CDC, 1989; Mauskopf, Bradley, & French, 1991). Despite the risk of transmission and the dangers associated with chronic HBV infection, many nurses and other health care workers failed to accept the seriousness of sharps injuries until the risk of HIV transmission by this route was identified (Henderson, 1995; Mundt 1992).

The risk of HCV transmission by sharps injury is believed to be considerably lower than the risk of transmitting HBV. In retrospective studies done in Japan, the estimated risk of HCV transmission by needle-stick injury was between 2.7% (Kiyosawa et al., 1991) and 10% (Mitsui et al., 1992). Lanphear et al. (1994) found a seroconversion rate of 6% in a study conducted in Rochester, New York. By comparison, in a Spanish study of 81 employees who had sustained a sharps injury from hepatitis C positive-individuals, there was no evidence of hepatitis C infection one year following the injury (Hernandez et al., 1992). One group of researchers found the risk of transmission was higher if the source was infected with both HIV and HCV, although the results were not statistically significant (Puro, Petrosillo, Ippolito, & Italian Study

Group on Occupational Risk of HIV and Other Bloodborne Infections, 1995). While there is growing evidence for the occupational risk of HCV transmission to health care workers, much remains unknown about the consequences of infection (Alter, 1994). However, it is believed that almost everyone who has hepatitis C infection will develop chronic carriage of the virus and about two thirds will have elevated liver enzymes (Alter, 1994).

The rate of HIV transmission by a sharps injury involving an infected individual is estimated to be between 0% (Bowden et al., 1993) and 2% (Heptonstall, Gill, Porter, Black, & Gilbert, 1993). The calculated rate from meta-analysis of worldwide studies is between 0.3% and 0.4% (Henderson et al., 1990; Marcus and the CDC Cooperative Needlestick Surveillance Group, 1988; Tokars et al., 1993).

The risk of seroconversion to HIV may be higher in injuries sustained following certain sub-categories of sharps procedures such as venepuncture or intramuscular injection (Heptonstall et al., 1993). Gerberding and Henderson (1992) assert that the risk of HIV transmission may be greater if the needle used has a hollow bore, if the worker's injury is deeply penetrating, or if blood is injected during the injury. In an effort to quantify a difference in risk, Bennett and Howard

(1994) found that the amount of blood transmitted in a simulated sharps injury from a phlebotomy needle was substantially higher than from a suture needle of comparable size. Shirazian, Herzlich, Mokhtarian, Spatoliatore, and Grob (1992) found that the volume of blood conveyed from a 20-gauge needle was 30 times greater than the amount from a 27-gauge needle.

The risk of HIV transmission from a needle that has been inserted into an intravenous line is probably substantially lower than the risk from a needle used to administer an injection directly. Manian, Meyer, and Jenne (1993) examined 501 intravenous ports of peripheral lines, heparin-locks, and central lines from a convenience sample of hospitalized patients. They concluded that the risk of transmission of infectious agents by injury from a needle inserted into a peripheral intravenous line or the distal port of a central venous line was nearly zero.

Post-exposure Management of Sharps Injury

Bloodborne infections cannot be prevented by pre-exposure vaccination except in the case of HBV. Therefore, the post-exposure management of sharps injuries is very important. Employers of care givers are advised to have a mechanism for the prompt reporting and

follow-up of every employee who sustains an injury from a used sharp (Fahey, Beekman, Schmitt, Fedio, & Henderson, 1993; Gerberding & Henderson, 1992). It is important to establish the occurrence of occupational transmission of bloodborne infections in order that the employee who becomes disabled as a consequence can be compensated. Section 19(6) of *The Workers' Compensation Act Alberta* (1995) stipulates:

If a worker suffers disablement from or because of any occupational disease and at some time during the 12 months preceding the disablement was employed in the industry or process deemed by the regulations to have caused that disease, the disease is deemed to have been caused by that employment unless the contrary is shown. (p. 23).

Although the Act is intended to be protective of the worker, this clause appears inadequate for disability from a bloodborne infection that may not be manifest until many years later.

The employee who incurs a sharps injury is entitled to counselling, testing, and an explanation of the laboratory results (Schultz, Harris, & Schultz, 1994). Testing for HBV and HIV is recommended at the time of the injury to determine the employee's current status. Testing care givers who have received the three doses of

hepatitis B vaccine is also indicated unless they have had a positive HBV antibody test within the past couple of years (National Advisory Committee on Immunization, 1993). Guidelines for counselling and routine testing for HCV are less clear but testing is now recommended by at least one authority (Laboratory Centre for Disease Control [LCDC], 1995).

Testing to determine possible HBV, HIV, and HCV infection in the person who is the source of the sharps injury is recommended if the individual consents (Gerberding, 1995). If the source is positive for any of the three infections, the exposed employee should have the appropriate testing repeated over a number of months to determine whether infection develops. Laboratory tests will usually indicate evidence of infection within six months of the exposure, but Meyohas, Morand-Joubard, Van de Wiel, Mariotti, and Lefrère (1995) describe a delay of eight months between exposure and HIV seroconversion following sharps injury in one individual.

Unimmunized or susceptible health care workers who sustain a significant exposure to HBV may receive passive immunization with hepatitis B immune globulin. A series of two doses of this post-exposure intervention, given as soon as possible after the exposure and repeated

one month later, is 75% effective in preventing HBV infection (CDC, 1990). Alternatively, a single dose of hepatitis B immune globulin plus a series of hepatitis B vaccine may be administered to induce extended protection.

To prevent HIV infection following sharps injury, a course of zidovudine, an antiviral medication, may be prescribed (Gerberding & Henderson, 1992), although the support for this therapy has been ambivalent (Gerberding & Henderson, 1992; Lanphear 1994). Ricketts and Deschamps (1992), in reviewing the reported HIV seroconversion among health-care workers worldwide, identified at least four instances where the administration of zidovudine failed to prevent HIV infection following exposure. Cardo et al. (1995) are the first researchers to suggest a protective effect of this drug in a case-control study of HIV seroconversion in health care workers following sharps injury.

No therapeutic measures are recommended currently to prevent HCV infection following occupational exposure (Gerberding, 1995; PHLS Hepatitis Subcommittee, 1993). Vigorous washing of the wound is recommended following any significant exposure to blood or body fluid, including a sharps injury (Gerberding and Henderson, 1992). Promoting bleeding at the site is also recommended, although the

efficacy of this intervention is unknown (Fahey et al., 1993). Interferon has been identified as a possible therapy but presently is not recommended (Gerberding 1995, van der Poel, Cuypers, & Reesink, 1994).

In summary, management following sharps injury cannot always prevent the transmission of HCV, HIV, or even HBV using current technology (Gerberding & Henderson, 1992).

Preventing Sharps Injury

Given the serious, and even fatal, consequences of sharps injuries and the limited effectiveness of post-exposure therapies, it is crucial that measures to prevent sharps injuries from occurring be found. Following the initial study by McCormick and Maki (1981), efforts focused on altering the behaviour of health care workers. When this failed to control the occurrence of sharps injuries, subsequent efforts were introduced, including the development of protective barriers, the engineering of safer devices, the substitution of non-invasive procedures, and the implementation of administrative controls.

Recapping, Disposal, and Transportation Behaviors Related to Sharps Injury

The first efforts to prevent sharps injuries centred around efforts

to eliminate the practice of recapping through education and convenient placement of puncture-resistant containers for the disposal of used sharps. For more than a decade, CDC has recommended that used needles should not be recapped and should be placed in puncture-resistant containers (CDC, 1982, 1987). Comparable recommendations were adopted in Canada (LCDC, 1987a); in the United Kingdom, it has been recommended that a used needle not be recapped unless there is a safe means of recapping (U.K. Department of Health, 1990). Despite the recommendation by CDC (1982, 1987) to refrain from recapping needles after use, McCormick et al. (1991) found that sharps injuries in nurses due to recapping rose from 7.9% of all sharps injuries during the late 1970s to 14.2% in the late 1980s.

A national survey of 3,094 hospital workers chosen randomly in the United States showed that one half of those surveyed recap their needles at least occasionally, a practice that has been associated with an increased risk of sharps injury (Hersey & Martin, 1994). One quarter of those responding to the survey had received a sharps injury during the previous year.

In a random sample of Alberta nurses, 94.5% of respondents considered themselves informed about the prevention of sharps injuries

(Alberta Health, 1992). Nevertheless, 76.3% of nurses reported recapping a used needle, even though 82.4% believe many sharps injuries are related to this practice. In Alberta, the practice of recapping used needles is most frequently reported by home care nurses (Alberta Health, 1992). The results of a 1989 survey of all acute care hospitals in Canada (Birnbaum, Schulzer, Mathias, Kelly, & Chow, 1990) showed that in 20% of smaller hospitals two-handed recapping of used needles may be the predominant practice for handling used needles.

Sharps injuries may be more likely to occur on a specific day of a rotation and possibly during a specific time period. One researcher found that more than one quarter of all injuries in part-time and full-time workers occurred on the first work day after days off, primarily within the first two hours of work (English, 1992).

The association between recapping needles and sharps injuries is believed to be so strong that some researchers document the rate of recapped, used needles as a surrogate marker for sharps injuries (Makofsky & Cone, 1993; Ribner & Ribner, 1990). In a study of HIV-related knowledge and behaviors among nurses in Michigan, Schillo and Reischl (1993) found a significant association between recapping used needles and sharps injuries. Ten percent of nurses who reported

recapping also reported a sharps injury, while only 3% of those who refrained from recapping reported an injury. Some authors suggest using a one-handed method to recap used needles as a safer alternative to the censured practice of two-handed recapping (Dalton et al., 1992; English, 1992).

Lancets also have been implicated in sharps injuries. Bowden et al. (1993) found that sharps injuries were twice as likely to be caused by lancets as by needle and syringe assemblies in one prospective study. Eisenstein and Smith (1992) also found scalpel blades and lancets were associated with the highest rates of sharps injuries. Stotka et al. (1991) cautioned that nurses specifically are the frequent recipients of sharps injuries when using lancets to obtain blood for glucose readings.

Many researchers have studied the effectiveness of programs aimed at the prevention of sharps injuries, primarily in acute care settings. Several researchers studied the effect of educational programs that discouraged recapping and encouraged the safer handling of sharps, and was combined with the introduction of rigid sharps containers (Edmond, Khakoo, McTaggart, & Solomon, 1988; Haiduvén et al., 1992; Krasinski, LaCouture, & Holzman, 1987; Linnemann, Cannon, DeRonde, & Lanphear, 1991; Ribner, Landry, Gholson, & Linden,

1987; Sanborn, Luttrell, & Hoffman, 1988; Sellick, Hazamy, & Mylotte, 1991; Smith, Eisenstein, Esrig, & Godbold, 1992).

Several authors were unable to demonstrate a significant reduction in sharps injuries (Edmond et al., 1988; Krasinski et al., 1987; Sanborn et al., 1988; Sellick et al., 1991; Smith et al., 1991), while others reported an increase in the number of sharps injuries (Linnemann et al., 1991; Ribner et al., 1987). Linnemann et al. (1991) questioned whether participation in the study enhanced health care workers' awareness, resulting in increased reporting of sharps injuries. Some authors reported a reduction in the rate of recapping (Ribner & Ribner, 1990; Makofsky & Cone, 1993), but only one study revealed a significant decrease in overall sharps injuries (Haiduven et al., 1992). One important difference between this study and the others described is the additional intervention of reporting summaries of sharps injuries back to staff, thereby increasing the awareness of injuries in their institution. In a descriptive study of injuries related to the disposal of used sharps, Weltman, Short, Mendelson, Lilienfeld, and Rodriguez (1995) found that sharps containers located more than four feet above the ground, lack of attendance at inservice education on universal precautions, and ironically, being within five feet of the nearest disposal

container were predictive factors for sharps injuries.

Studies have shown that the risk of sharps injury exists not only after use of the sharp and during its disposal but also during the transportation of used sharps. Jagger et al. (1988) describe the risk to housekeeping staff who transport garbage in which used needles have been inappropriately disposed. English (1992) reported that 7% of sharps injuries were related to emptying trash or handling laundry in hospitals. McCormick et al. (1991) found that collection and disposal of dirty linen and procedure trays were the activities most commonly being performed at the time of the sharps injury.

McNabb and Keller (1991) suggest that those providing educational programs to prevent sharps injuries should discuss the situations in which nurses are more likely to abandon safety precautions and offer alternatives to risky behavior. Identifying "expert" nurses who can act as role models should also be considered.

Perception of Risk

Sharps injuries related to recapping are considered preventable (Kopfer & McGovern, 1993). Understanding why health care workers fail to comply with a well-known, recommended preventive measure, such as recapping, may lead to improved control. Using a mid-range

theory, such as the Health Belief Model, may help us to learn why health care workers who know that recapping is dangerous continue to practice this risky behavior.

The Health Belief Model, a conceptual model developed by four social psychologists to explain and predict compliance with measures to prevent disease, has evolved since the 1950s (Rosenstock, 1974).

Originally, the model presented four factors which influence the adoption of preventive health behaviors: the perceived susceptibility to disease, the perceived seriousness, the perceived efficacy of the preventive intervention, and the barriers to preventive behavior such as cost, inconvenience, or pain. The model has been revised to include perceived self-efficacy as an additional variable (Rosenstock, Strecher, & Becker, 1988).

Willy, Dhillon, Loewen, Wesley, and Henderson (1990) conducted a study of health care workers who have frequent exposure to blood. They concluded that perception of risk was a more important factor for compliance with measures to prevent sharps injuries than knowledge of disease transmission. Fahey et al. (1993) assert that health care workers, in general, are reassured by what they consider to be a surprisingly low rate of HIV transmission from sharps injury. Further, it

has been shown in studies of risk perception in the general population that a majority of people in a majority of situations consider themselves less at risk than the average (Fischhoff, Bostrom, and Quadrel, 1991).

Williams, Campbell, Henry, and Collier (1994) employed the Health Belief Model as a conceptual framework to study the variables influencing compliance with universal precautions in the emergency department. The factor most commonly cited as a barrier was lack of time. The next most commonly stated factor was presuming the client to be at low risk of bloodborne infection. This factor may be most relevant to nurses' perceived susceptibility to infection.

Engineering Safer Devices or Substituting Non-Invasive Procedures

Jagger, Hunt, Brand-Elnaggar, and Pearson (1988) reviewed the rates of sharps injuries in a hospital in Virginia to determine the frequency of injuries by specific device used and the point at which the injury occurred during the procedure. While the greatest number of injuries were caused by disposable syringes, the highest rates of injury were caused by devices that required disassembly following use. Care givers incurred nearly 17% of their injuries before or during use of the device, 70% while preparing it for disposal and 13% after disposal. This

study was the catalyst for shifting the emphasis from modifying the behaviour of health care workers to seeking engineering solutions or substitution for the prevention of sharps injuries (Lanphear, 1994).

Similarly, in a longitudinal study of 12 hospitals in Italy, Ippolito et al. (1994) found that devices requiring manipulation, such as intravenous catheter stylets, were associated with higher rates of sharps injuries. The authors note that the use of needles to access IV lines has been a hazardous practice exclusive to the United States and English-speaking Canada. On the other hand, needleless access to IVs has been standard practice in other developed countries. In studies from both countries, however, the greatest number, but the lowest rate, of sharps injuries were associated with disposable needles and syringes (Jagger et al., 1988; Ippolito et al., 1994).

As research evidence increasingly revealed that modifying behaviour failed to reduce overall sharps injuries, it was concluded that it was necessary to seek other means of prevention, preferably safer devices (Birnbaum et al., 1990; Holloway 1992, Jagger 1987, Gerberding, 1992; McGeer et al., 1990). Jagger and Pearson (1991) assert that sharps may be used unnecessarily, and that sharps should be used only when it is necessary to pierce the skin of an individual.

Similarly, Landolfo (1992) argues that decreasing the number of procedures requiring needles is the most effective method of reducing sharps injuries. Sharps injuries are related not only to recapping and improper disposal but also to the device itself (Gershon, Karkashian, & Felknor, 1994).

Some believe that sharps injuries can be reduced by the introduction of barriers placed between the sharp and the individual using it. It has been estimated that devices with passive safety mechanisms that do not have to be triggered by the user can reduce between 48% and 67% of sharps injuries (Mendelson et al., 1993). By comparison, devices with mechanisms that must be activated by the user are estimated to reduce only between 17% and 28% of injuries. Few studies exploring the use of barriers to prevent sharps injuries have been reported. No recent studies are reported from the United States, where recapping or removing used needles from a syringe are now prohibited unless the employer can demonstrate that no other option is available (Occupational Safety and Health Administration [OSHA], 1991).

Goldwater, Law, Nixon, Officer, and Cleland (1989) described a four-fold decrease in sharps injuries following an education program and the introduction of a needle recapping device. In their conclusion, the

authors challenged CDC's (1985) recommendation for a nonrecapping policy. However, the results of this study may be biased as subjects were self-selected into the study groups (Birnbaum et al., 1990).

Whitby, Stead, and Najman (1991) investigated the same needle recapping device tested by Goldwater et al. (1989) and found a significant increase in the frequency of reported sharps injuries. They speculated that their findings were more likely due to an increase in reporting of sharps injuries rather than a true increase in incidence. Younger, Hunt, Robinson, and McLemore (1992) found a significant decrease in sharps injuries using 3cc safety syringes. The safety syringes had a shield which is pulled over the needle following use and obviates recapping.

In a Canadian study, Ng, Volkening, and Evans (1991) reported no sharps injuries after the introduction of a safety paddle, but these authors fail to report the number of injuries occurring before the intervention and do not indicate whether the findings are significant. Wright and Ferrer (1993) found a significant decrease in sharps injuries in an acute care facility following the introduction of a needle cover that can be applied using one hand.

Kopfer and McGovern (1993) stress the need for engineering

controls to isolate or eliminate the hazard of bloodborne infection from the workplace. Three design measures developed to prevent sharps injuries are disposable syringes that come with a sheath that locks in place after use, needle guards similarly used to cover the needle after use, and needle-recapping devices that incorporate a shield ("Special Report," 1991). While there have been only a few studies published assessing the effectiveness of protective barriers, greater efforts have been devoted recently toward the development of safer devices and the substitution of non-invasive procedures to prevent sharps injuries.

A promising device for decreasing sharps injuries is the needleless IV system. Centers that have introduced a needleless intravenous system have recorded an almost immediate reduction in the overall number of sharps injuries (Rutowski & Peterson, 1993; Skolnick, LaRocca, Barba, & Paicius, 1993). In Canada, a needleless intravenous system has been instituted in the home care program of Metropolitan Toronto (Sherlock & Mildon, 1994).

Numerous studies involving needleless IV-access systems have been conducted. All but one (Savino & Napolitano, 1994) found a reduction in sharps injuries following the introduction of needleless IV-access systems (Beason, Bourguignon, Fowler, & Gardner, 1992; D'Arco

& Hargreaves, 1995; Dugger, 1992; Gartner, 1992; Rutowski & Peterson, 1993; Skolnick, LaRocca, Barba, & Paicius, 1993; Prince, Summers, & Knight, 1994; Yassi, McGill, & Khokhar, 1995). One of the studies did not assess whether sharps injuries were reduced but instead assessed care givers' satisfaction with the device (Savino & Napolitano, 1994). Several studies discuss the economic impact of safer devices (Dugger, 1992; Gartner, 1992; Rutowski & Peterson, 1993; Yassi et al., 1995). Dugger (1992) and Gartner (1992) report a cost-savings, while Rutowski and Peterson (1993) claim that any increased cost is offset by the reduced need for follow-up of injured workers. Yassi et al. (1995) argue that additional costs or savings of the needleless system are dependent upon the type of patients receiving care.

Apart from the needleless IV systems, there have been only a few products introduced as substitutions for needles and other sharps. A needleless medication and vaccine injector is described in a comprehensive review of devices for preventing sharps injuries (ECRI, 1994). A limitation of this device, however, is that only 1 mL of medication can be administered at a time. One of the primary uses of this device may be in immunization procedures.

In summary, needleless IV-access systems appear to be the most

effective measure currently available for reducing sharps injuries.

Further, they are the only safer devices for which scientific studies have been published. However, injuries from needleless IV-access systems may be the least likely to transmit bloodborne infections (Owens-Schwab & Fraser, 1993). Additional measures, such as administrative controls and organizational support, are also needed.

Organizational Approaches

Organizational approaches to the prevention of sharps injury direct the focus away from the behaviors of the worker and concentrate upon the framework in which it occurs (Skillen, 1996). Conrad (1987) declares there has been a proclivity throughout history of blaming injured workers, who become labelled as accident-prone.

Policies that outline measures to be taken to prevent, or procedures to be taken in the event of, a sharps injury are examples of an organizational approach. In the United States, The *Occupational Exposure to Bloodborne Pathogens; Final Rule* is an administrative control intended to educate and protect all who may be exposed occupationally to blood and body fluids (Barlow & Handelman, 1992). Important components of this Standard include the employer's need to have a written plan for controlling exposures, to provide hepatitis B

immunization to staff, to provide relevant training and to have a protocol for post-exposure evaluation of injuries (Barlow & Handelman, 1993; OSHA, 1991). The employer is totally responsible for staff of hospitals who fail to comply with precautions to prevent exposure.

Critics of the Standard question if it will have a detrimental impact upon the occurrence of infections that are transmitted by modes other than blood exposure and if it will affect the cost of caring for patients (CDC, 1994b). Either is a possibility if preventing exposures to blood or body fluids becomes the entire focus of infection prevention or if care givers wear gloves or other protective clothing excessively, in situations where exposure is unlikely. The language of the Standard is prescriptive and permits little discretion (Decker, 1992). For example, care givers are required to wear gloves in certain situations and only rare exceptions are permitted (OSHA, 1991). One of the strengths of the Standard may be the requirement for evaluating exposure incidents.

Worldwide, programs for the surveillance of health care workers exposed occupationally to HIV have been instituted in a number of countries. The United States was the first to initiate a program of national surveillance in 1983 (Marcus et al., 1988). A program in the United Kingdom began during 1984 (Heptonstall et al., 1993), followed

by a program in Canada in 1985 (LCDC 1987b) and in Italy in 1986 (Ippolito, Puro, De Carli, and the Italian Study Group on Occupational Risk of HIV Infection, 1993). In Canada, a recommendation has been made recently to expand the surveillance program to include HCV (LCDC, 1995). The purpose of any surveillance program is to identify the magnitude of a problem using the measures of person, place and time to facilitate the development of prevention and control measures (Thacker, 1994).

Jagger (1994b) states that in order to provide a safer workplace, it is essential to provide timely information to health care workers who provide care directly. She advocates the use of the Exposure Prevention Information Network (EPINet), a computerized system for data collection, analysis and reporting of sharps injuries, as an effective tool for surveillance. The system allows analysis at a local or national level. Locally, hazards specific to a site can be identified (Exposure Network Data, 1994). Nationally, data can be compiled from many sites to determine more quickly the rates of sharps injuries from devices used infrequently ("First Results From EPINet", 1993).

Seto, Ching, Chu, and Fielding (1990) studied the effect of different types of programs to deter recapping, including one with an

administrative component. They concluded that a program combining the establishment of a policy regarding sharps injuries, which is supported by in-service education and is supplemented by posters and pamphlets, is the most effective way to discourage recapping. Makofsky and Cone (1993) found that a simple environmental change of installing sharps containers closer to the point-of-use significantly reduced the frequency of recapping. The development of appropriate policies for the prevention, monitoring and follow-up of control of sharps injuries will likely be a necessary adjunct for improved control.

In summary, although the relative emphasis of various measures to reduce sharps injuries may have changed over time, a combination of strategies appears necessary. Wugofski (1992) states sharps injuries can be reduced by substitution, engineering controls, administrative controls, and the use of personal protective equipment. Jackson and Lynch (1991) claim that sharps injuries result from a combination of four factors: design deficiencies, inadequate training, lack of appropriate supplies, and inadequate management attention.

Studies of Community-based Nurses

The environmental factors associated with sharps injuries in the hospital setting have been clearly delineated. Hazards pertaining to

specific areas of the hospital including the emergency department (Henderson 1995, Tandberg, Stewart, & Doezenia, 1991), the operating room (Telford & Quebbeman, 1993), the delivery suite (Short & Bell, 1993), the dialysis unit (Petrosillo, Puro, Jagger, Ippolito, & the Italian Multicenter Study on Nosocomial and Occupational Risk of Infections in Dialysis, 1995) and anaesthesiology (Berry & Greene 1992) have been published. Few studies have focused on sharps injuries in the community setting.

Skillen (1992) assessed the occupational hazards, including the risk of sharps injuries, for public health nurses. She acknowledged that some of the sharps injuries may have resulted from recapping used sharps but contends that organizational factors are more likely to be responsible. Organizational factors are integral to hazards in the physical work environment; examples of organizational factors include workload, availability of protective equipment, and work scheduling (Skillen, 1996).

One facet of a descriptive study by White and Smith (1993) was to determine whether there were standards and educational programs for infection control in home care agencies. All who responded to the survey indicated that there were written policies regarding universal

precautions and the handling of used sharps. However, less than 90% reported that education on these topics was provided to employees.

There is a need for epidemiologic research which addresses the risk of sharps injury for nurses working in the community (Backinger & Koustenis, 1994; Smith & White, 1993; White & Smith, 1993). As the delivery of services provided in the home grows rapidly and the types of services become increasingly complex and invasive (White, 1992), the need to establish the incidence of sharps injuries and the related factors in this setting becomes more urgent. Nurses who provide care in the home are less able to control their working environment and, therefore, may be at greater risk of sharps injuries. Factors such as poor lighting, crowded conditions, furniture that cannot be adjusted, makeshift equipment, cramped working space and working alone with clients who may be agitated, abusive or confused may enhance the likelihood of sharps injuries in home care nurses. The degree of under-reporting of sharps injuries might be even greater in this setting where no formal mechanism for reporting may exist.

CHAPTER III

METHOD

This study utilized a descriptive correlational survey design to obtain information regarding the incidence of and factors related to sharps injuries sustained by home care nurses working in the community and to examine the relationship between recapping, disposal, and transportation of used sharps and sharps injuries in home care nurses.

A survey design was chosen because the variables cannot be manipulated in a controlled setting, but could be investigated retrospectively (Brink & Wood, 1988). A descriptive analysis was used for those situational factors experienced by home care nurses that may place them at risk of sharps injuries but which have not been studied previously. Descriptive data were collected regarding factors surrounding the sharps injuries sustained by home care nurses. A correlational analysis was used for examining the relationship between the recapping, disposal, and transportation of used sharps and sharps injuries because information existed to suggest a relationship between these behaviors and sharps injuries sustained by nurses working in other settings. This chapter includes information on the sample, development of the data collection instrument, data collection and analysis, and ethical

considerations.

Sample

Sample Selection

All Registered Nurses in Alberta who indicated on their 1994 registration form that they worked in home care and that clinical nursing was their primary area of responsibility were included in the sample. Home care nurses whose primary area of responsibility was nursing administration, nursing education, or nursing research were excluded from the sample.

The sample was derived electronically in August, 1995 by the Alberta Association of Registered Nurses (A.A.R.N.) from their current list of members. The last review of the membership list had been done by the A.A.R.N. nearly one year previously. A systematic review of membership data is done each year in September, when all Registered Nurses are required to renew their membership. Nurses are asked to complete a registration form and to review the A.A.R.N.'s record of their employment and demographic data, confirming the accuracy and updating as appropriate.

Some of the changes that occur within the membership during the year will be captured on the list of members, while other changes

will not. Home care nurses who moved to Alberta after the annual registration review should be included on the membership list because they are required to register with the provincial nursing association in order to practice and use the title *Registered Nurse*. However, it is probable that not all nurses who indicated that they worked in home care at the time of registration review would still be employed in this area. Moreover, it is probable that the mailing addresses for some of the members had changed during the interval, but the changes of address may not be reflected on the list. Despite these probable inaccuracies in the A.A.R.N. membership list, it provided the only feasible means of reaching the sample.

Sampling Design

A disk containing the list of the selected names and addresses of Registered Nurses working in home care was supplied by the A.A.R.N. to a company, *RN Mailing Services Ltd.*, which sends mailouts routinely for the Association. A covering letter regarding the study (Appendix A), a copy of the questionnaire (Appendix B), and a stamped, return envelope were sent by the company to each home care nurse on the list on September 6, 1995.

The goal was to survey all home care nurses who provided care

directly to clients. Although the sample chosen was home care nurses working in clinical practice, an attempt was made to verify that all nurses in the sample provided care directly to clients. Subjects were asked on the questionnaire to indicate whether or not they provide direct service to home care clients. Those who did not were asked to return their questionnaire unanswered and were excluded from the analysis. A total of 111 home care nurses indicated that they did not provide direct care to clients and their responses were excluded from the analysis.

In total, 1031 surveys were mailed out. The private company refused to affix return addresses to the envelopes, and therefore it is unknown how many of the 1031 surveys could not be delivered because the address was incorrect. A reminder letter (Appendix C) and another questionnaire was sent on October 10, 1995 to all subjects for whom a response had not been received by October 2, 1995.

The private company used a numbering system to identify every questionnaire mailed and was able to identify who had, or had not, responded. Only the researcher opened the responses; only the private company had the code to link the list of home care nurses to the numbered coding system. This enabled the researcher to guarantee

subjects' anonymity while making it possible to have a reminder letter and questionnaire sent to nurses in the sample who did not respond to the initial mailing.

The A.A.R.N. was asked whether the address section of the membership lists for 1994 and 1995 could be compared electronically to estimate the number of subjects who did not receive the questionnaires because of a change in their addresses. However, the software program used for maintaining the A.A.R.N. membership had recently been changed, and it was not feasible to electronically compare the addresses of home care nurses for the two membership years.

Sample Size

The entire population of home care nurses working in Alberta was surveyed for this study. During 1994, 993 nurses were employed in home care, either full-time or part-time (C. L. Decker, personal communication, November 17, 1994). The incidence of sharps injury in home care nurses was unknown but based on previous studies of sharps injuries, it was estimated that at least 10% would sustain an injury annually. It was estimated that 400 responses were required to permit analysis using independent variables of interest, such as recapping, disposal and transportation behaviors, for potentially small subgroups

within the sample. The analysis of the smallest subgroup of interest within a sample is an important factor in determining the size of the sample (Fowler, 1993).

A total of 459 questionnaires were returned following the first mailout, a 44.5% response rate. A reminder letter and a second questionnaire were mailed to 629 home care nurses. Fifty-seven home care nurses who returned their first questionnaire late received the reminder letter and additional questionnaire. One of the fifty-seven responded a second time, but the second response was not included in the analysis.

After the second mailout, 196 home care nurses responded, including the 57 late responses to the original mailout. In total, there were 654 of 1031 home care nurses who returned their questionnaires. Of this number, 111 did not provide care directly to clients and were therefore ineligible for inclusion in the analysis, leaving 543 eligible (654-111). This represents a response rate of at least 59.0%, obtained by dividing the number of responses that were eligible (543) by the revised denominator of 920 (1031 minus 111 ineligible questionnaires that were returned).

A response rate of 63.4% can be obtained using a different

method. Assuming that the proportion of those who did not provide direct care to clients is the same in the non-respondents' group as it was in the respondents' ($111/654=.17$), then 64 of the 377 non-respondents should be excluded. The total eligible for the sample then becomes 856 home care nurses (1031 minus 111 respondents who responded but did not provide direct care and the estimated 64 non-respondents who did not provide direct care). A response rate of 63.4% (543 [home care nurses who returned the questionnaire and who provided direct care to clients] /856) is determined using this method.

The response rate may have actually been higher because not all 1031 subjects may have received the questionnaire; specifically, those subjects who had moved during the past year. The final sample included 543 subjects.

Data Collection Instrument

Questionnaire Construction

A structured, fixed alternative questionnaire (Appendix B), which included a total of 27 questions, was developed by the researcher and included both newly designed questions based on the literature review of sharps injuries and questions adapted from other tools. The questionnaire was designed according to Dillman's (1978)

recommendations, and was presented in a 22-page booklet form, printed on off-white paper.

Questions 6 and 14 were adapted from the Alberta Health Survey (Alberta Health, 1992). Questions 19, 20, 21, 22, 23, and 24 were adapted from the instrument developed by Hersey and Martin (1994). Neither the reliability nor the validity was reported for either instrument. Permission to use the adapted questions was received from the authors before the questionnaire was tested (Appendix D).

The first section of the survey included questions regarding availability of hepatitis B immunization for health care workers, associated costs of the vaccine, personal history of immunization against hepatitis B, and the number of doses received (Questions [Q] 1-4). The next questions pertained to specific hazards that may be present in the home health care setting and the frequency of performing procedures using sharps (Q5&6). The following sections (Q7-9) addressed practices related to recapping, disposal, and transportation of used sharps. The next segment addressed the incidence of sharps injuries and descriptive data related to these injuries (Q10-18). This was followed by questions regarding subjects' perception of risk for hepatitis B, hepatitis C, and HIV, as well as existing policies related to the prevention of bloodborne

infections (Q19-22). Demographic data were collected in the final section (Q23-27).

The survey was retrospective; home care nurses were asked to recall their sharps injuries during the preceding 12 months. Much of the data were collected using a Likert-type scale, which permitted interval level data to be collected (Mishel, 1989). Nominal and ordinal-level data were also collected. The computer-determined readability index of the questionnaire and covering letter was determined using a computer software package (Rightwriter, 1989). The questionnaire required a grade seven level of reading ability and the covering letter required a grade ten level.

Pretest of Instrument

A pilot study was conducted during May and June of 1995 with home care nurses working in Saskatoon, Saskatchewan. A package containing 38 covering letters, questionnaires, and envelopes with return postage was sent to the Director of Home Care at the Saskatoon Health Unit for distribution to home care nursing staff. Of 38 questionnaires sent, 26 were returned (68.4% response). The pilot study was conducted outside of Alberta in order to maintain the eligibility of the entire population of Alberta home care nurses for the survey.

One purpose of the pilot study was to determine the reliability index of three sets of questions (Q7-9). Other purposes included determining the length of time needed to complete the questionnaire, whether any questions were ambiguous, and any unanticipated problems (Brink and Wood, 1988). Data from the pilot study were analyzed using SPSS® for Windows™ (Norusis, 1993). Changes were made to questions 7, 8, and 9 following the pretest.

Internal Consistency of the Questionnaire

Three indexes were developed to measure recapping, disposal, and transportation behaviors. An index created from several items that measure a single attribute is more dependable than is a single measure (Babbie, 1989). In the pilot study, the standardized item alpha of the index related to recapping was .79; a coefficient alpha of .70 or higher is recommended for a new scale (Mishel, 1989).

A standardized item alpha of .36 was determined for the index related to disposal of used sharps. Consequently, one of the questions regarding disposal of used sharps was deleted from the pilot questionnaire, two new questions were added, and two questions were revised for the survey.

For the index related to transportation of used sharps, a

standardized item alpha of .50 was established. As a result, one of the questions in this index was revised for the final version of the questionnaire. A second pilot study to test the changes to the questionnaire was not conducted.

Content Validity of Questionnaire

The content validity of the questionnaire was determined by a panel of six judges. The panel consisted of the three members of the thesis committee, one infection control nurse, one home care consultant, and a nurse epidemiologist from a community setting. Panelists were asked to rate each question on a four-point scale, where one denoted an irrelevant item and four denoted a very relevant item (Lynn, 1986). Items were retained in the questionnaire if five of the six panelists agreed it rated a level of three or above. In addition, panelists were asked whether there were any omissions from the tool. Every question received a rating of at least three from all panelists. As a result of the input from panelists, the wording of some questions was changed to improve clarity.

Data Collection

A mail survey was chosen specifically because of the dispersion of subjects across the province, lower cost compared to the cost associated

with conducting personal interviews, anonymity, and less interviewer bias (Fowler, 1993). The data collection period spanned slightly more than three months.

The first copy of the questionnaire (Appendix B) and covering letter (Appendix A) were mailed to subjects on September 6, 1995. The first set of questionnaires was collected from the A.A.R.N. by the researcher on September 14, 1995. A reminder letter (Appendix C) and another copy of the questionnaire were sent on October 10, 1995 to those subjects from whom a response had not been received by October 2, 1995. The last questionnaire was collected on December 8, 1995.

The researcher received five phone calls from subjects. One home care nurse called to congratulate the researcher for her choice of study. Two called to seek further information regarding the potential dangers from sharps injuries including the risk of transmitting bloodborne infections from a used sharp. Two subjects telephoned to question whether they were appropriate for inclusion in the study. Neither were providing care directly to clients in the home and both were asked to return their questionnaire unanswered.

There were very little missing data from the returned questionnaires. The only exception was a lower than expected response

to the question asking those subjects who reported they had received hepatitis B vaccine to indicate how many doses they had been given (Q4). In question 3, 456 of 543 respondents stated they had received hepatitis B vaccine. Those who stated they had received hepatitis B vaccine were asked how many doses they had received. Only 408 of the 456 responded, 48 (10.5%) did not answer the question. The low response rate is suggestive of a problem with the question and may be indicative of ambiguity in wording or in the physical layout of the previous question (Q3). The instruction in question 3 that directed subjects to proceed to question 5 was intended only for those respondents who had never been immunized against hepatitis B. The instruction was not placed directly adjacent to the "no" response and therefore it may have been misinterpreted.

All questions on the survey were closed-ended. However, some respondents chose to make unsolicited comments in the margins of the questionnaire. Several noted that recapping was a bad habit that was hard to break and at least five noted that they were unfamiliar with needle shields. The comments of two respondents were especially poignant to the researcher. In one case, a respondent noted in the margin that she/he had sustained a sharps injury several years ago and

consequently became a chronic hepatitis B carrier. In another case, a respondent commented that she/he worked both in home care and for an insurance company. The respondent stated that the employers from the insurance industry "couldn't care less" about the welfare of their employees.

Data Analysis

The dependent variable in the study was sharps injury or absence of sharps injury sustained by home care nurses during the previous 12 months. The unit of analysis is each home care nurse, some of whom sustained one or more injuries during the previous 12 months. The independent variables were recapping, disposal, and transportation of used sharps.

The data were prepared for computer analysis by coding responses into numerals using a code book prepared for this study. All data were coded by the investigator and entered into a data file on a home computer using SPSS® for Windows™ (Norusis, 1993). The code used for missing data was 99; missing data were excluded in analysis. Each entry was checked twice for detection of errors. Fifty questionnaires were subsequently chosen at random and reviewed for accuracy of data entry. Frequencies were run for every variable, in order to check for

inconsistent data. The final data file is considered to be free of coding errors.

The data were measured on nominal, ordinal, and interval-level scales. Interval-level data using the Likert scale were collected for Questions 7, 8, and 9. Interval-level data were also collected for the year of graduation from nursing (Q24). The data for year of graduation were grouped into five ten-year periods. Similarly, interval-level data were collected for the number of years respondents had worked in nursing. Again, the data for years worked in nursing were grouped into five 10 year categories. Finally, interval-level data were collected for the average number of hours worked weekly by respondents. These data were grouped into five ten-hour periods.

Several new variables were created from the original variables to facilitate the analysis. A dichotomous, nominal variable was created from the question related to the dependent variable: home care nurses who did and did not sustain a sharps injury within the preceding 12 months (Q11). The three answers that were actually possible and were coded originally in response to the question "Have you sustained one or more injuries from a used needle or sharp that pierced your skin during the past 12 months?" were: yes, no, and not applicable. Not applicable

was the entry coded for home care nurses who did not respond to the question because they had answered negatively to the previous question "While at work have you ever sustained one or more injuries from a used needle or sharp that pierced your skin" and were directed to skip the next set of questions in the survey. In the newly created variable both the "no" and the "not applicable" responses were included in the negative category.

In the pilot study, an index was constructed to obtain one composite measure for the eight recapping behaviors. An alpha reliability coefficient of .79 (standardized item alpha) was determined for the recapping index following the pilot study. However, in the results of the survey, the reliability coefficient fell to .38 and the index could not be used as a reliable measure of recapping behaviors. The reliability coefficient rose to .51 if only the first four variables related to recapping were included in the index, but this was still too low to be considered a reliable measure. The effect of each variable as a single entity was evaluated because the index was not reliable.

An index to measure eight behaviours related to disposal was evaluated. A reliability coefficient of .36 was determined following the pilot study: one question was deleted, one new question was added, and

one question was modified. The reliability coefficient rose to .61 in the study but was still too low to be considered a reliable measure for behaviors related to disposal of used sharps. The effect of each variable was evaluated singly.

An index to measure six items related to transportation of used sharps was created. A reliability coefficient of .50 was determined in the pilot study. Consequently, one question was modified. However, the reliability coefficient fell even lower to .37 and the index could not be used as a reliable measure for transportation of used sharps. The effect of each variable was evaluated singly.

Descriptive statistics were utilized for determining the incidence of sharps injuries sustained by home care nurses, the number of home care nurses who were immunized against hepatitis B disease, and the average number and the variability in the number of procedures performed weekly. Descriptive statistics were also utilized to analyze the reasons for not reporting sharps injuries, the factors related to incurred sharps injuries, environmental factors, the frequency of policies and procedures related to sharps injuries, and home care nurses' perceptions of susceptibility to bloodborne infections. Univariate analysis of variables is shown in frequency tables and one bar chart.

Cross tabulations were used to compare the relationship between sharps injuries and perceived risks of infection, presence of policies, and the behaviors of recapping, disposal and transportation of used sharps. The Pearson chi-square statistic was used to test whether there was a statistically significant relationship between sharps injuries and the variables of interest. The level of significance was set at $p \leq .05$.

New variables were created for the recapping, disposal, and transportation variables (Q7- 9) and for perceived risk (Q19&20) by collapsing categories when the data were skewed. Analysis of the newly created variables was conducted using the Chi-square statistic.

Ethical Considerations

This research project was approved by the Ethics Review Committee, a Joint Committee of the Faculty of Nursing, University of Alberta and University of Alberta Hospitals (Appendix E). A covering letter was enclosed with the questionnaire (Appendix A). The letter outlined the purpose of the study, described the potential risks to participants, pledged that anonymity and confidentiality would be provided for those participating, and requested voluntary participation from subjects. No remuneration was offered as an incentive and subjects were informed there was no direct benefit from their participation.

However, subjects were informed that one benefit from the study might be an improved understanding of the factors related to sharps injuries in the home care setting and that this understanding might lead to prevention strategies.

The expected time required to complete the questionnaire was noted in the covering letter. Subjects were informed of the qualifications, addresses, and phone numbers of the researcher and her supervisor. Consent to participate in the study was inferred by the return of the questionnaire.

The anonymity of subjects was protected. The A.A.R.N. provided a disk containing the list of subjects and their addresses directly to the company that mailed out the survey. The researcher did not have access to this information. Subjects returned the questionnaires to the A.A.R.N. using the stamped addressed envelope that was included in the mailout. All envelopes that were returned were opened by the researcher herself.

The confidentiality of subjects was protected. Only the researcher reviewed raw data. Subjects were informed that data would be aggregated in the thesis and in any subsequent publications. No individual and no organization can be identified from the data. The

returned questionnaires are stored in a locked cupboard and will be kept
for at least seven years.

CHAPTER IV

RESULTS

This chapter outlines the findings of the study. First, the characteristics of the sample are described. Secondly, the behaviors, attitudes, and structural factors related to the prevention of sharps injuries are presented. The third section contains information regarding the sharps injuries incurred by home care nurses. The final section outlines the relationship between sharps injuries and selected factors.

Characteristics of Respondents

Demographic data were collected for the highest level of education completed, the year of graduation from the basic nursing program, the number of years worked in nursing, and the average number of hours worked per week. A Registered Nursing diploma was the highest educational level achieved for 58% of respondents; 37.3% had a baccalaureate degree in nursing. The year of graduation from nursing for respondents ranged from 1951 to 1995; 1974 was the median year of graduation. Data regarding education and the time of graduation are missing for some home care nurses. Four nurses did not provide their level of education and two did not provide their year of graduation from nursing. The data for level of education and for year of

graduation are presented in Table 1.

Table 1. Education and Time of Graduation of Respondents

	%	n
Education		
RN	58.0%	313
Diploma in Public Health	2.4%	13
Bachelor's Degree (Non-Nursing)	0.6%	3
Bachelor's Degree Nursing	37.3%	201
Master's Degree (Non-Nursing)	0.4%	2
Master's Degree Nursing	1.3%	7
Total	100%	539
Time of Graduation from Nursing		
1946 - 1955	1.1%	6
1956 - 1965	14.2%	77
1966 - 1975	39.2%	212
1976 - 1985	30.5%	165
1986 - 1995	15.0%	81
Total	100%	541

The mean number of years worked by home care nurses in the study was 18; the range was 1 to 41 years ($SD = 7.8$). Table 2 compares the number of years worked, collapsed into periods of 10 years, by level of education. The data for the level of education have been collapsed from seven categories (RN diploma, diploma in Public Health, Baccalaureate degree, Baccalaureate degree in Nursing, Master's degree, Master's degree in Nursing, & PhD) into three categories (diploma in nursing - RN diploma or RN diploma plus diploma in Public Health, Baccalaureate degree - nursing or non-nursing, and Master's degree -

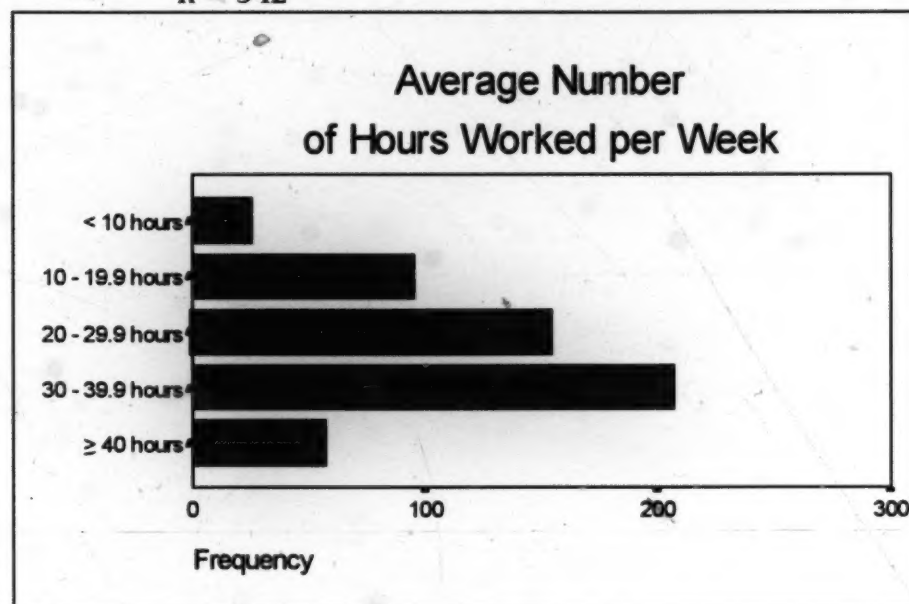
nursing or non-nursing). Table 2 provides information for 538 of 543 respondents; data are missing for five home care nurses.

Table 2. Level of Education by Years Worked in Nursing

n=538	Nursing Diploma	Baccalaureate Degree	Masters Degree
< 10 Years	42 (12.9%)	52 (25.5%)	1 (11.1)
10 - 19 Years	124 (38.2%)	86 (42.2%)	5 (55.6%)
20 - 29 Years	135 (41.5%)	57 (27.9%)	2 (22.2%)
30 - 39 Years	23 (7.1%)	8 (3.9%)	1 (11.1%)
40 - 49 Years	1 (0.3%)	1 (0.5%)	
Total	325 (100%)	204 (100%)	9 (100%)

The mean number of hours worked weekly by home care nurses was 27.3, with a standard deviation of 9.8 hours. The reported range was from as few as 2 to as many as 50 hours weekly. The median number of hours worked was 28, but full-time work (35 hours per week) was the mode. To present this information in graph form, the data were collapsed into ten-hour categories and are shown in Figure 1.

Figure 1. Average Number of Hours Worked Weekly
n = 542



Behaviors, Attitudes, and Structural Factors

Related to Prevention of Sharps Injury

Hepatitis B Immunization Status

Hepatitis B immunization had been offered by the employer to 481 of the 543 (88.6%) respondents. However, 56 (10.3%) home care nurses reported they had not been offered hepatitis B vaccine, one (0.2%) home care nurse was unsure whether it had been offered, and 5 (0.9%) did not answer the question. Of the respondents, 401 (73.8%) home care nurses stated that hepatitis B immunization was available

currently without charge from their employer; 109 (20.1%) stated hepatitis B vaccine was not available to them free from their employer, 16 (2.9%) were unsure whether it was, and 17 (3.1%) did not answer the question.

Of the 543 respondents, 456 (84%) reported that they had been immunized against hepatitis B. Of the remainder, 81 (14.9%) had not been immunized, 1 (0.2%) did not know, and 5 (0.9%) did not answer the question.

Of the 408 home care nurses who reported the number of doses of hepatitis B vaccine that they had received, 336 (82.4%) reported they had received three or more doses of hepatitis B vaccine, 38 (9.3%) stated they had received two doses, 17 (4.2%) stated they had received one dose, and 17 (4.2%) did not know how many doses they had received. A series of three doses of hepatitis B vaccine are recommended for active immunity (National Advisory Committee on Immunization, 1993).

In short, more than 80% of those responding had been immunized against hepatitis B and of those immunized, more than 80% had received the recommended doses of vaccine. Almost three quarters of the respondents could obtain hepatitis B vaccine free of charge. The

data for the percentage of home care nurses who have been immunized against hepatitis B and the number of doses they have received are presented in Table 3.

Table 3. Hepatitis B Immunization

	n	%
Home Care Nurses Who		
Have received hepatitis B Vaccine	456	84.0%
Have not received hepatitis B Vaccine	81	14.9%
Do not know vaccination status	1	0.2%
No response to question	5	0.9%
Total	543	100%
Number of Doses Given		
One dose	17	4.2%
Two doses	38	9.3%
Three doses	319	78.2%
More than three doses	17	4.2%
Do not know how many doses received	17	4.2%
Total	408	100.1%

Percentages may not add to 100% due to rounding

Frequency of Procedures

Home care nurses were asked how many times per week, on average, they performed the following procedures: blood glucose testing, venepuncture, starting a hypodermoclysis, discontinuing a hypodermoclysis line, intramuscular injection, subcutaneous injection, intradermal injection, starting an intravenous, discontinuing an intravenous, and adding medication to an intravenous line (Q6). Some

gave a range in their response to the question (e.g., 5 to 10 times per week). When a range was given, the midpoint was entered as the response (e.g., 7.5 is the midpoint for the response "5 to 10 times per week").

There was much variation in the frequency of performing procedures that may have been due primarily to the variation in the number of hours worked weekly. Many of the procedures were not performed by home care nurses in an average week; blood glucose testing was the procedure performed most commonly. Although the median number of blood glucose tests done weekly was 2, the range was from 0 to 30 tests. Similarly, the median number of subcutaneous injections given weekly was 1, the range was from 0 to 36 tests. Table 4 provides a summary of frequency with which home care nurses performed the procedures using the median and the range.

Table 4. Number of Procedures Performed Weekly

Procedure	Median	Range
Blood glucose testing	2	0 - 30
Subcutaneous injections	1	0 - 36
Intramuscular injections	1	0 - 24
Adding medication to an IV line	0	0 - 21
Venepuncture	0	0 - 13
Starting an IV line	0	0 - 15
Discontinuing an IV line	0	0 - 15
Intradermal injections	0	0 - 12
Starting a hypodermoclysis line	0	0 - 5
Discontinuing hypodermoclysis	0	0 - 5

Policies and Procedures Regarding Sharps Injuries

Subjects were asked whether their employer had a procedure for reporting sharps injuries. Four hundred and twenty of 523 (80.3%) reported there was a procedure. Those who indicated there was a procedure were asked the purpose of reporting sharp injuries and were permitted to provide more than one reason. The purpose reported most frequently by home care nurses was for the improved prevention of sharps injuries, followed closely by workers' compensation, and for statistical purposes. Far fewer responses related to performance reviews. Fifty-two home care nurses responded that the purpose for reporting was unknown. Table 5 provides a summary of the responses.

Table 5. Purpose of Reporting Sharps Injuries in Agency

Reason	n	% of Total Responses
Improved prevention	333	33.3%
Workers' compensation	298	29.8%
Statistical purposes	264	26.4%
Performance reviews	53	5.3%
Unknown	52	5.2%
TOTAL	1000	100%

Subjects were asked whether their employer had established specific policies regarding 13 issues related to sharps injuries. More than 80% of respondents indicated there was a policy regarding the reporting

of sharps injuries during the day, compared to just over 65% who reported there was a policy for reporting sharps injuries after hours or on weekends. More than 73% reported there was a policy regarding the use of puncture-resistant sharps containers, but less than one third of respondents indicated there was a policy regarding the level of filling for the containers. Slightly more than two thirds reported there was a policy for hepatitis B immunization for employees. Just over two thirds had a policy regarding the recapping of needles. Nearly 58% of respondents reported there was a policy for transporting used sharps from the home. Of those responding, 38.5% stated there was a policy for drawing blood from a staff member who sustains a sharps injury and 35.5% reported a policy for post exposure therapy, but only 22.8% indicated there was a policy regarding post exposure counselling for staff. Less than one quarter of respondents reported there was a policy for obtaining the client's consent for post exposure testing, 21.6% stated there was a policy for obtaining the blood promptly from the client who was the source of the injury, and 8.1% reported there was a policy regarding post exposure counselling for the client. A summary of their responses is contained in Table 6.

Table 6. Policies Related to Sharps Injury

Policy	Yes, there is a policy	No, there is no policy	Unsure	n %
Recapping of needles	357 66.1%	62 11.5%	121 22.4%	540 100%
The use of puncture-resistant containers	398 73.7%	61 11.3%	81 15.0%	540 100%
The level of filling sharps containers	163 30.2%	169 31.4%	207 38.4%	539 100%
Transporting sharps containers from the client's home	317 58.7%	90 16.7%	133 24.6%	540 100%
Hepatitis B vaccination for staff	363 67.3%	70 13.0%	106 19.7%	539 100%
Reporting of sharps injuries during the day	441 81.7%	35 6.5%	64 11.9%	540 100.1%
Reporting of sharps injuries after dayshift or on weekends	354 65.7%	53 9.8%	132 24.5%	539 100%
Obtaining client consent for post exposure blood sampling	130 24.2%	114 21.2%	293 54.6%	537 100%
Drawing blood promptly from the staff member after injury	208 38.5%	95 17.6%	237 43.9%	540 100%
Drawing blood promptly from the client who is the source	115 21.6%	99 18.6%	319 59.8%	533 100%
Post exposure counselling for the staff member	122 22.8%	141 26.3%	273 50.9%	536 100%
Post exposure counselling for the client who is the source	43 8.1%	154 28.8%	337 63.1%	534 100%
Protocol for receiving hepatitis B immune globulin or other treatment	190 35.5%	66 12.3%	279 52.1%	535 99.9%

Percentages may not add to 100% due to rounding

Home Care Nurses' Perception of Susceptibility

Home care nurses were asked whether they strongly agreed, agreed, had no opinion, disagreed, or strongly disagreed with statements regarding perceived susceptibility to bloodborne infections. Nearly 80% of respondents agreed, or strongly agreed, with the statement that home care nurses are at significant risk of becoming infected with hepatitis B on the job and more than 85% believe that they personally are at risk. More than 80% of home care nurses agreed, or strongly agreed, with the statement that the most common means of transmitting hepatitis B in the workplace is by sharps injury.

Less than 10% of home care nurses agreed, or strongly agreed, that hepatitis B vaccine costs them too much money. More than 80% disagreed, or strongly disagreed with the statement that hepatitis B vaccine causes bad side effects.

More than half of respondents agreed, or strongly agreed, that home care nurses are at significant risk of becoming infected with hepatitis C on the job. More than one third agreed, or strongly agreed, that they are concerned they may become infected with hepatitis C occupationally. A summary of the home care nurses responses in relation to HBV and HCV is provided in Table 7.

Table 7. Perceived Susceptibility to HBV and HCV

	Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree	n %
Home care nurses are at significant risk of becoming infected with hepatitis B on the job.						
	157	264	26	83	9	539
	29.1%	49.0%	4.8%	15.4%	1.7%	100%
I am concerned that I may become infected with hepatitis B on the job.						
	45	208	47	204	35	539
	8.3%	38.6%	8.7%	37.8%	6.5%	99.9%
The most common means of transmitting hepatitis B in the workplace is by sharps injury.						
	157	290	49	33	9	538
	29.2%	53.9%	9.1%	6.1%	1.7%	100%
The hepatitis B vaccine costs me too much money.						
	19	31	44	162	283	539
	3.5%	5.8%	8.2%	30.1%	52.5%	100.1%
The hepatitis B vaccine is not effective.						
	4	11	110	268	149	542
	0.7%	2.0%	20.3%	49.4%	27.5%	99.9%
The hepatitis B vaccine often causes bad side effects.						
	6	18	79	291	147	541
	1.1%	3.3%	14.6%	53.8%	27.2%	100%
Personally, I am not at risk of hepatitis B on the job.						
	9	40	26	336	131	542
	1.7%	7.4%	4.8%	62.0%	24.2%	100.1%
Home care nurses are at significant risk of becoming infected with hepatitis C on the job.						
	53	223	169	77	10	532
	10.0%	41.9%	31.8%	14.5%	1.9%	100.1%
I am concerned that I may become infected with hepatitis C on the job.						
	26	171	155	160	19	531
	4.9%	32.2%	29.2%	30.1%	3.6%	100%

Percentages may not add to 100% due to rounding

A set of seven questions regarding home care nurses' perception of susceptibility to HIV infection were asked. Just over 60% of respondents agreed, or strongly agreed, with the statement that home care nurses have a significant risk of acquiring HIV infection occupationally. However, less than half agreed, or strongly agreed they were concerned that they may become infected with HIV on the job.

More than 90% of home care nurses agreed, or strongly agreed, that they knew how to protect themselves from HIV infection. More than three quarters of respondents agreed, or strongly agreed, that there is no effective treatment currently available. More than 99% disagreed, or strongly disagreed, with the statement that there is nothing you can do to prevent HIV infection. Less than 5% of home care nurses agreed, or strongly agreed, that they could tell which of their clients were HIV-infected. A summary of the responses is provided in Table 8.

Table 8. Perceived Susceptibility to HIV

	Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree	n %
Home care nurses have a significant risk of becoming infected with HIV on the job.	84 15.5%	242 44.6%	22 4.1%	173 31.9%	21 3.9%	542 100%
I am concerned that I may become infected with HIV on the job.	44 8.1%	207 38.1%	31 5.7%	223 41.1%	38 7.0%	543 100%
I know how to protect myself from exposure to HIV on the job.	163 30.0%	349 64.3%	12 2.2%	15 2.8%	4 0.7%	543 100%
Personally, I am not at risk of getting infected with HIV from a sharps injury.	24 4.4%	105 19.4%	33 6.1%	288 53.1%	92 17.0%	542 100%
HIV infection cannot be treated effectively.	185 34.3%	232 43.0%	39 7.2%	67 12.3%	17 3.1%	540 99.9%
Really, there's little you can do to prevent getting infected with HIV.	2 0.4%	0 0%	1 0.2%	194 35.8%	345 63.7%	542 100.1%
I believe I can tell which of my clients are infected with HIV.	7 1.3%	11 2.0%	15 2.8%	214 39.4%	296 54.5%	543 100%

Percentages may not add to 100% due to rounding

In summary, respondents believe that home care nurses in general are most at risk of becoming infected with HBV (nearly 80% agree or strongly agree), followed by HIV (just more than 60% agree or strongly agree), and are less concerned that home care nurses are at risk for HCV (just over 50% agree or strongly agree). Similarly, respondents believe

that they personally are most concerned that they may become infected with HBV on the job (46.9% agree or strongly agree), followed closely by their concern that they may become infected with HIV occupationally (46.2%), and were less concerned that they may become infected with HCV on the job (less than 40% agree or strongly agree).

Environmental Risks in the Home

Home care nurses were asked how often they dealt with six environmental factors that could influence their safety. Nearly 79% of home care nurses reported there was adequate lighting often or almost always. Just over 43% of respondents stated that the area they used for laying out their equipment was often or almost always convenient.

Less than 12% stated it was often or almost always difficult to perform procedures because of the available furniture. More than 37% of respondents stated they could never or could rarely provide care to agitated clients without risk of personal injury if they were working alone; more than 35% responded they could sometimes provide care alone to these clients without personal risk of injury. More than 85% reported they had to assume awkward positions at least some of the time to provide nursing care because of limited space or unsuitable furniture in the home; 36.3% reported they had to assume an awkward position

often or almost always. Only 27.3% of those responding reported that they were never, or only rarely, disturbed by family members, visitors, or pets when performing invasive procedures. More than half (50.8%) reported they were disturbed sometimes and 21.4% reported they were disturbed often or almost always. Table 9 outlines a summary of home care nurses' responses regarding environmental risks in the home setting.

Table 9. Environmental Factors in the Home

	Never	Rarely	Sometimes	Often	Almost Always	n %
There is adequate lighting available to provide nursing care.						
	0	8	107	224	200	539
	0%	1.5%	19.9%	41.6%	37.1%	100.1%
It is difficult to perform invasive procedures when the client lies in a bed or sits on furniture that cannot be adjusted.						
	24	184	268	55	7	538
	4.5%	34.2%	49.8%	10.2%	1.3%	100%
When working alone, it is possible to provide care to agitated clients without increased personal risk of injury.						
	29	170	189	86	53	527
	5.5%	32.3%	35.9%	16.3%	10.1%	100.1%
It is sometimes necessary to assume awkward positions to provide care because of limited space or unsuitable furniture.						
	4	73	266	183	14	540
	0.7%	13.5%	49.3%	33.9%	2.6%	100%
The area used for laying out equipment is convenient.						
	2	66	238	169	65	540
	0.4%	12.2%	44.1%	31.3%	12.0%	100%
There may be disturbances from family, visitors, or pets when performing invasive procedures.						
	15	133	276	110	6	540
	2.8%	24.6%	51.1%	20.4%	1.1%	100%

Percentages may not add to 100% due to rounding

Recapping Behaviors

Home care nurses were asked how frequently they performed eight behaviors related to recapping. More than half (58.3%) never, or rarely, recapped used needles. However, out of those who did recap, about one third used a two-handed method often, or almost always; just more than one third used a one-handed method often or almost always. More than 95% did not bend, break, or cut off used needles. Nearly 40% of respondents had used their fingers to remove a used lancet from a holder often, or almost always, in the previous month. More than 90% of respondents never, or rarely, used needlecaps with built in shields, syringes with built in caps, or commercial hand shields to protect them from injury. A summary of their responses is provided in Table 10.

Table 10. Frequency of Recapping Behaviors

	Never	Rarely	Sometimes	Often	Almost Always	n %
During the last month, I recapped needles.						
	208	105	96	53	75	537
	38.7%	19.6%	17.9%	9.9%	14.0%	100.1%
During the last month, I bent, broke, or cut off used needles.						
	490	26	15	3	5	539
	90.9%	4.8%	2.8%	0.6%	0.9%	100%
When I recap a needle I use both hands.						
	262	53	41	35	143	534
	49.1%	9.9%	7.7%	6.6%	26.8%	100.1%
During the past month, I used my fingers to remove a lancet from a holder.						
	217	39	73	78	130	537
	40.4%	7.3%	13.6%	14.5%	24.2%	100%
I recap needles using a commercial hand shield to protect me from injury.						
	508	12	4	5	3	532
	95.5%	2.3%	0.8%	0.9%	0.6%	100.1%
I use needlecaps that have built in shields.						
	464	22	21	14	11	532
	87.2%	4.1%	3.9%	2.6%	2.1%	99.9%
I use syringes that have built in caps that slide over the needle after use.						
	472	22	13	14	14	535
	88.2%	4.1%	2.4%	2.6%	2.6%	99.9%
When I recap, I lay the needle on a flat surface and slide the needle tip into the cap.						
	222	58	67	71	116	534
	41.6%	10.9%	12.6%	13.1%	21.8%	100%

Percentages may not add to 100% due to rounding

Disposal Behaviors

Home care nurses were asked how frequently they used eight different methods to dispose of used sharps. In assessing those behaviors that may protect against sharps injury, more than two thirds reported

they disposed of used sharps often, or almost always, in a commercial sharps container. More than three quarters of home care nurses almost always dispose of the used sharp immediately after use. About 70% report the sharps container is often, or almost always, nearby when they perform the invasive procedure.

With respect to those behaviors that may place the nurse at risk of sharps injury, just over one quarter stated they often, or almost always, had to carry the used sharp to dispose of it. Nearly one quarter of those responding often, or almost always, disposed of used sharps in a container that could be penetrated by a sharp, such as an empty bleach bottle. More than 80% of home care nurses never dispose of a used sharp in the client's garbage. Less than 5% of home care nurses reported that they often, or almost always, had to dispose of used sharps in containers that are too full. Nearly 40% have to disassemble equipment often, or almost always, before disposing of the used sharp. A summary of the frequency of disposal behaviors is provided in Table 11.

Table 11. Frequency of Disposal Behaviors

	Never	Rarely	Sometimes	Often	Almost Always	n %
I dispose of used sharps in a commercial sharps container.						
	38	41	85	78	293	535
	7.1%	7.7%	15.9%	14.6%	54.8%	100.1%
I must carry the used sharp to dispose of it.						
	141	127	128	70	64	530
	26.6%	24.0%	24.2%	13.2%	12.1%	100.1%
I dispose of used sharps in a container such as an empty bleach bottle.						
	174	100	132	75	55	536
	32.5%	18.7%	24.6%	14.0%	10.3%	100.1%
I dispose of used sharps immediately after use.						
	10	14	32	71	409	536
	1.9%	2.6%	6.0%	13.2%	76.3%	100%
The sharps container is nearby when I do the procedure.						
	26	44	89	135	240	534
	4.9%	8.2%	16.7%	25.3%	44.9%	100 %
I dispose of used sharps in the client's garbage.						
	435	68	22	5	6	536
	81.2%	12.7%	4.1%	0.9%	1.1%	100%
I have to place used sharps in containers that are too full.						
	158	186	172	15	4	535
	29.5%	34.8%	32.1%	2.8%	0.7%	99.9%
I have to disassemble equipment before disposal (e.g., lancet from holder or IV)						
	121	76	125	105	108	535
	22.6%	14.2%	23.4%	19.6%	20.2%	100%

Percentages may not add to 100% due to rounding

Transportation Behaviors

Home care nurses were asked how frequently they transported used sharps by six different methods. Of the behaviors that may reduce the risk of sharps injury, nearly half of home care nurses reported that

they often, or almost always, transported used sharps in a commercial sharps container with a lid that can be securely fastened and reopened on a subsequent visit. More than three quarters of respondents never transport used sharps in a container that could be penetrated by a used sharp, such as an empty bleach bottle. Nearly 90% of home care nurses stated they never transported used sharps in a container that could break.

Of the behaviors that may increase the risk of sharps injury, 7% of home care nurses reported that they often, or almost always, transported used sharps in a commercial sharps container without the lid securely fastened because the lid could be fastened only once. Almost 2% reported they often, or almost always, carry used sharps loosely in their nursing bag. Less than 0.5% report they often, or almost always, share their nursing bags with other nurses who leave used needles in the bag. A summary of the responses is given in Table 12.

Table 12. Frequency of Transportation Behaviors

	Never	Rarely	Sometimes	Often	Almost Always	n %
I transport sharps in a container with a lid that can be fastened and reopened later.	188 35.5%	38 7.2%	44 8.3%	44 8.3%	216 40.8%	530 100.1%
I transport sharps in a commercial sharps container without the lid securely fastened.	399 75.4%	65 12.3%	28 5.3%	11 ^D 2.1%	26 4.9%	529 100%
I transport sharps in a container that can be penetrated(e.g., empty bleach bottle).	405 76.1%	67 12.6%	33 6.2%	15 2.8%	12 2.3%	532 100%
I transport used sharps in a container that can break, such as a glass bottle.	466 87.8%	30 5.6%	23 4.3%	7 1.3%	5 0.9%	531 99.9%
I transport used sharps loosely in my nursing bag.	424 80.0%	69 13.0%	27 5.1%	5 0.9%	5 0.9%	530 99.9%
I share my nursing bag with other nurses who leave used needles in the bag.	475 89.5%	37 7.0%	18 3.4%	0 0%	1 0.2%	532 100.1%

Percentages may not add to 100% due to rounding

Sharps Injuries Incurred by Home Care Nurses

Of the 543 home care nurses responding, 252 (46.4%) recalled having an occupational sharps injury sometime during their career, 249 (45.9%) stated they had never had a sharps injury, 25 (4.6%) were uncertain whether they had incurred one, and 17 (3.1%) did not respond to the question. There were 82 (15.1%) home care nurses who reported they had sustained a sharps injury within the preceding 12

months. Of these, 60 home care nurses reported one sharps injury, 21 reported two sharps injuries, and one home care nurse each reported three and four sharps injuries, for a total of 107 injuries. Table 13 presents the frequency and number of sharps injuries sustained by home care nurses in the past 12 months.

Table 13. Frequency of Sharps Injury in Past 12 Months

Number of Sharps Injuries in the Preceding 12 Months	# of Home Care Nurses Reporting	Number of Injuries	% of Nurses Reporting Injury
1 injury	60	60	73.2%
2 injuries	20	40	24.4%
3 injuries	1	3	1.2%
4 injuries	1	4	1.2%
Total	82	107	100%

Time of Occurrence of Sharps Injury

There were two questions in the survey for obtaining information regarding the time of day and the number of shifts worked in a row to determine when sharps injuries were more likely to occur. More than one third (36.9%) were unable to recall the hour of their shift and more than half (57%) were unable to recall which day of their shift when the most recent sharps injury occurred. No pattern was evident for those who could remember.

Reporting of Sharps Injury

Of the 82 home care nurses who had incurred one or more sharps

injuries within the past 12 months, only 32 (39.5%) reported all of their sharps injuries, 1 (1.2%) reported some but not all, 48 (59.3%) did not report the sharps injuries, and 1 (1.2%) did not answer the question.

Home care nurses who did not report their sharps injuries (50 nurses) were asked why and were allowed to provide more than one reason.

The most common reason given for not reporting the sharps injury was that the home care nurse did not think it was important, followed by having received hepatitis B vaccine, the reporting procedure takes too much time, being embarrassed or having personal reasons for not reporting, and being unaware of the reporting procedure. Fear of being reprimanded for reporting the injury and feeling that the agency's policy discourages the reporting of sharps injuries were offered much less frequently as reasons. Table 14 provides the frequency of responses for the different reasons why sharps injuries are not reported.

Table 14. Reasons Given for not Reporting Sharps Injuries

Reason	Frequency	% of Total Responses
Didn't think it was important	18	21.4%
Had hepatitis B vaccine	17	20.2%
Reporting procedure takes too much time	16	19.0%
Embarrassed, personal reasons	13	15.5%
Unaware of reporting procedure	13	15.5%
Fear of being reprimanded	5	6.0%
The policy discourages reporting sharps injuries	2	2.4%
Total	84	100%

Activities Related to the Occurrence of Sharps Injury

Home care nurses who had sustained one or more sharps injuries within the past 12 months were asked what activities were related to the sharps injuries. Removing a lancet was the factor reported most commonly, followed closely by recapping a used needle. Almost 56% of all injuries were related to these activities. Transporting a used sharp accounted for just under 10% of injuries. Table 15 presents the frequencies of factors related to sharps injuries.

Table 15. Activities Performed at Time of Sharps Injury

Factor	# of injuries	% of Injuries
Removing lancet from holder	31	28.4%
Recapping a used needle	30	27.5%
Transporting used sharp	10	9.1%
Placing sharp in overfilled container	6	5.6%
Adding medication to IV line	4	3.7%
Removing needle from syringe by hand	3	2.8%
Discontinuing IV line	3	2.8%
Bending, breaking, or cutting used needle	3	2.8%
Starting a hypodermoclysis	2	1.8%
Discontinuing hypodermoclysis	2	1.8%
Starting an IV line	1	0.9%
Other	14	12.8%
TOTAL	107	100%

Incidence of Sharps Injury

Of those responding, 15.1% of home care nurses incurred a

sharps injury within the past 12 months. However, this percentage is determined from nurses who are employed in either a full- or a part-time capacity. The number of hours per week worked by respondents ranged from 2 to 50 hours; the average number of hours worked was 27.3 hours.

To demonstrate the burden of risk, the rate of injuries per person year was determined in the following way. The respondents were asked to estimate the number of hours worked in an average week. Assuming that home care nurses have 10 days off for statutory holidays and three weeks of vacation, home care nurses work 47 weeks per year.

The total number of hours worked in an average week by all home care nurses who responded to the survey was 14,739.5; in one year it is estimated this group of home care nurses work 692,756.5 hours (14739.5×47 weeks). One full-time home care nurse working 37.5 hours weekly, works 1762.5 hours per year, on average. The total of 692,756.5 hours, therefore, represents 393.1 years of full time nursing practice ($692,756.5 \div 1762.5$).

There were 107 injuries sustained by the home care nurses during the past year. The rate of sharps injury per year of full-time nursing work is calculated at .27 ($107 \div 393.1$). In other words, there is greater

than a one in four chance that a home care nurse will sustain an injury in one year of full-time work.

Contextual Factors Related to Sharps Injury

Home care nurses who sustained sharps injuries within the previous 12 months were asked whether there were existing factors present in the home that may have contributed to their sharps injuries. The existing factor reported most commonly was that of being rushed (44.3%) at the time of the sharps injury, while being unfamiliar with the procedure was least common (2.3%). Table 16 shows the reported frequency of specific factors at the time of sharps injuries. Some respondents indicated that more than one factor contributed to some sharps injuries; therefore, the sum exceeds the total number of home care nurses who sustained a sharps injury in the past 12 months.

Table 16. Contextual Factors in the Home Setting

Factors	n	% of Total Responses
Being rushed when the procedure was performed	39	44.3%
Assuming an awkward position to perform the procedure	19	21.6%
The furniture was inadequate as a working space	13	14.8%
The client moved during the procedure	8	9.0%
The lighting was inadequate	7	8.0%
Being unfamiliar with the procedure	2	2.3%
Total	88	100%

Relationship between Sharps Injury and Selected Factors

Sharps Injury by Respondent Characteristics

Using the Chi-square statistic, there was no significant relationship found between the dependent variable, home care nurses who sustained a sharps injury within the preceding 12 months, and their level of education, year of graduation from nursing, average number of hours worked weekly, or the number of years worked in nursing ($p > .05$). There was also no significant relationship between hepatitis B immunization status and the occurrence of sharps injury within the past 12 months ($\chi^2 = 1.2$, $p > .05$).

Policies and Sharps Injury

Table 17 examines the relationship between having written policies and sustaining sharps injuries within the preceding 12 months using the Chi-square statistic. A statistically significant relationship was found between 8 of the 13 policies and sharps injury. In general, a pattern is evident from the table that suggests that the presence of a policy is protective against sharps injury.

A statistically significant relationship was found between the following written policies and sharps injury: a policy for transporting sharps containers from the client's home ($\chi^2 = 7.1$, $p = .05$), a policy for reporting sharps injuries during the day ($\chi^2 = 15.0$, $p = .0006$), reporting of sharps

injuries after dayshift and on weekends ($\chi^2 = 7.9$, $p = .02$), drawing blood promptly from the staff member who sustained the injury ($\chi^2 = 10.3$, $p = .006$), drawing blood promptly from the client who was the source of the injury ($\chi^2 = 8.0$, $p = .02$), post-exposure counselling for the injured staff member ($\chi^2 = 14.9$, $p = .0006$), post-exposure counselling for the client ($\chi^2 = 9.8$, $p = .008$), and a protocol for receiving hepatitis B immune globulin ($\chi^2 = 19.0$, $p = .00008$).

The relationship between a policy regarding recapping and sharps injury is not statistically significant ($p = .10$), even though a larger percentage (66.7%) of home care nurses who did not sustain a sharps injury within the past 12 months reported there was a written policy compared to home care nurses who had sustained an injury (63.4%).

The relationship between having a written policy regarding the level of filling sharps containers and sharps injuries was not significant ($p = .10$). As well, the relationship between having a policy regarding hepatitis B immunization for staff and sharps injury was not significant ($p = .25$).

The relationship between having a policy for the use of puncture-resistant sharps containers and sharps injury within the preceding 12 months approached significance ($\chi^2 = 5.9$, $p = .052$). However, the presence of this policy is associated with an increased risk of injury.

Table 17. Relationship between Policies and Sharps Injury

Policy	Yes	No	Unsure	n	χ^2	p
Recapping of needles						
With Injury	52 63.4%	15 18.3%	15 18.3%	82 100%	4.7	.10
No Injury	304 66.7%	47 10.3%	105 23.0%	456 100%		
Use of puncture-resistant sharps containers						
With Injury	63 76.8%	13 15.9%	6 7.3%	82 100%	5.9	.052
No Injury	334 73.2%	47 10.3%	75 16.4%	456 99.9%		
Level of filling sharps containers						
With Injury	25 30.5%	33 40.2%	24 29.3%	82 100%	4.6	.10
No Injury	138 30.3%	135 29.7%	182 40.0%	455 100%		
Transporting sealed sharps containers from the client's home						
With Injury	42 51.2%	22 26.8%	18 22.0%	82 100%	7.1	.03*
No Injury	274 60.1%	68 14.9%	114 25.0%	456 100%		
Hepatitis B vaccination for staff						
With Injury	54 65.9%	15 18.3%	13 15.9%	82 100.1%	2.8	.25
No Injury	308 67.7%	55 12.1%	92 20.2%	455 100%		
Reporting of sharps injuries during the day.						
With Injury	55 67.1%	8 9.8%	19 23.2%	82 100.1%	15.0	.0006*
No Injury	385 84.4%	27 5.9%	44 9.6%	456 99.9%		

Percentages may not add to 100% due to rounding

* indicates significant finding

Table 17 continued on next page

Policy	Yes	No	Unsure	n	χ^2	p
Reporting of sharps injuries after dayshift or on weekends.						
With Injury	43 52.4%	12 14.6%	27 32.9%	82 99.9%	7.9	.02*
No Injury	311 68.4%	41 9.0%	103 22.6%	455 100%		
Drawing blood promptly from the staff member with injury						
With Injury	21 25.6%	23 28.0%	38 46.3%	82 99.9%	10.3	.006*
No Injury	187 41.0%	72 15.8%	197 43.2%	456 100%		
Obtaining client consent for post-exposure blood sampling.						
With Injury	19 23.5%	22 27.2%	40 49.4%	81 100.1%	2.1	.34
No Injury	111 24.4%	91 20.0%	252 55.5%	454 99.9%		
Drawing blood promptly from the client who is source of injury						
With Injury	13 16.0%	24 29.6%	44 54.3%	81 99.9%	8.0	.02*
No Injury	102 22.7%	75 16.7%	273 60.7%	450 100.1%		
Post-exposure counselling for the injured staff member						
With Injury	11 13.6%	35 43.2%	35 43.2%	81 100%	14.9	.0006*
No Injury	111 24.5%	106 23.4%	236 52.1%	453 100%		
Post-exposure counselling for the client who is source of injury						
With Injury	4 4.9%	35 43.2%	42 51.9%	81 100%	9.8	.008*
Without Injury	39 8.6%	119 26.4%	293 65.0%	451 100%		
Protocol for receiving hepatitis B immune globulin						
With Injury	18 22.2%	21 25.9%	42 51.9%	81 100%	19.0	.00008*
No Injury	172 38.1%	45 10.0%	235 52.0%	452 100.1%		

Perceived Risk and Sharps Injury

Table 18 shows the relationship between perceived risk and sharps injury. For the analysis, cells were collapsed into three categories because the distribution was skewed. The three categories analyzed were those who agreed, or strongly agreed with the statement, those who had no opinion, and those who disagreed, or strongly disagreed, with the statement. Respondents who sustained a sharps injury within the preceding 12 months were not significantly more likely to agree that home care nurses are at risk of becoming infected with HBV on the job compared to respondents who had not ($\chi^2=2.9$, $p=.23$). There was a statistically significant relationship between sharps injury and home care nurses' belief that hepatitis B vaccine costs too much money ($\chi^2=7.6$, $p=.02$). The relationship between respondents' concern that they personally may become infected with HBV occupationally and sharps injury approached significance ($\chi^2=5.9$, $p=.053$).

There was not a statistically significant relationship between respondents' belief that home care nurses are at risk of becoming infected with HCV occupationally and sharps injury ($\chi^2=.14$, $p=.93$). However, there was a statistically significant relationship between respondents' concern that they personally may become infected with HCV on the job and sharps injury ($\chi^2=6.8$, $p=.05$).

Table 18. Perceived Risk of HBV or HCV and Sharps Injury

	Agree or Strongly Agree	No Opinion	Disagree or Strongly Disagree	n	χ^2	p
Home care nurses are at significant risk of becoming infected with hepatitis B on the job.						
With Injury	70 85.4%	2 2.4%	10 12.2%	82 100%	2.9	.23
No Injury	351 77.1%	23 5.1%	81 17.8%	455 100%		
I am concerned that I may become infected with hepatitis B on the job.						
With Injury	48 59.3%	6 7.4%	27 33.3%	81 100%	5.9	.053
No Injury	204 44.7%	41 9.0%	211 46.3%	456 100%		
The most common means of transmitting hepatitis B in the workplace is sharps injury.						
With Injury	64 79.0%	9 11.1%	8 9.9%	81 100%	1.3	.51
No Injury	383 84.2%	39 8.6%	33 7.3%	455 84.9%		
The hepatitis B vaccine costs me too much money.						
With Injury	13 15.9%	10 12.2%	59 72.0%	82 100.1%	7.6	.02*
No Injury	37 8.1%	34 7.5%	384 84.4%	455 100%		
The hepatitis B vaccine is not effective.						
With Injury	3 3.7%	15 18.3%	64 78.0%	82 100%	.45	.80
No Injury	12 2.6%	94 20.5%	352 76.9%	458 100%		
Personally, I am not at risk of becoming infected with hepatitis C on the job.						
With Injury	6 7.3%	3 3.7%	73 89.0%	82 100%	.69	.71
No Injury	43 9.4%	23 5.0%	392 85.6%	458 100%		
The hepatitis B vaccine often causes bad side effects.						
With Injury	4 4.9%	13 16.0%	64 79.0%	81 99.9%	.26	.88
No Injury	20 4.4%	65 14.2%	373 81.4%	458 100%		

Table 18 continued on next page

	Agree or Strongly Agree	No Opinion	Disagree or Strongly Disagree	n	χ^2	p
Home care nurses are at significant risk of becoming infected with hepatitis C on the job.						
With Injury	43 53.8%	25 31.3%	12 15.0%	80	.14	.93
No injury	233 51.8%	143 31.8%	74 16.4%	450		100%
I am concerned that I may become infected with hepatitis C on the job.						
With Injury	39 48.8%	23 28.8%	18 22.5%	80	6.8	.03*
No Injury	158 35.2%	131 29.2%	160 35.6%	449		100%

* indicates significant finding
Percentages may not add to 100% due to rounding

Table 19 shows that respondents who had sustained a sharps injury within the preceding 12 months were significantly more likely than their colleagues who had not had an injury to think that home care nurses have a significant risk of becoming infected with HIV on the job ($\chi^2=7.2$, $p=.03$). Further, there was also a significant difference between those who had, and had not, sustained a sharps injury within the preceding 12 months and their perceived risk that they may become infected with HIV on the job ($\chi^2=14.4$, $p=.0008$). No other significant associations were found.

Table 19. Perceived Risk of HIV and Sharps Injury

	Agree or Strongly Agree	No Opinion	Disagree or Strongly Disagree	n	χ^2	p
Home care nurses have a significant risk of becoming infected with HIV on the job.						
With Injury	58 70.7%	5 6.1%	19 23.2%	82 100%	7.2	.03*
No Injury	266 58.1%	17 3.7%	175 38.2%	458 100%		
I am concerned that I may become infected with HIV on the job.						
With Injury	53 64.6%	5 6.1%	24 29.3%	82 100%	14.4	.0008*
No Injury	197 42.9%	25 5.4%	237 51.6%	459 99.9%		
I know how to protect myself from exposure to HIV on the job.						
With Injury	74 90.2%	2 2.4%	6 7.3%	82 99.9%	4.2	.12
No Injury	436 95.0%	10 2.2%	13 2.8%	459 100%		
Personally, I am not at risk of getting infected with HIV from a sharps injury.						
With Injury	15 18.3%	4 4.9%	63 76.8%	82 100%	2.2	.34
No Injury	114 24.9%	29 6.3%	315 68.8%	458 100%		
HIV cannot be treated effectively.						
With Injury	59 72.0%	6 7.3%	17 20.7%	82 100%	2.2	.34
No Injury	358 78.5%	32 7.0%	66 14.5%	456 100%		
Really there's little you can do to prevent getting infected with HIV.						
With Injury	1 1.2%	0 0%	81 98.8%	82 100%	2.1	.36
No Injury	1 0.2%	1 0.2%	456 99.6%	458 100%		
I believe I can tell which of my clients are infected with HIV.						
With Injury	3 3.7%	1 1.2%	78 95.1%	82 100%	.89	.64
No Injury	15 3.3%	14 3.1%	430 93.7%	459		

Percentages may not add to 100% due to rounding

* indicates significant finding

Sharps Injury and Recapping Behaviors

The relationship between frequency of recapping behaviors and whether or not home care nurses sustained one or more sharps injuries within the previous 12 months was tested using the Chi-square statistic.

A summary of the findings is provided in Table 20 and Table 21.

Table 20. Relationship Between Recapping Behaviors and Sharps Injury

	Never	Rarely	Sometimes	Often	Almost Always	n	χ^2	p
During the past month, I recapped used needles.								
With Injury	18 22%	13 15.9%	19 23.2%	11 13.4%	21 25.6%	82 100.1%	19.9	.0005*
No Injury	190 41.9%	91 20.1%	76 16.8%	42 9.3%	54 11.9%	453 100%		
When I recap a needle I use both hands.								
With Injury	30 36.6%	7 8.5%	9 11.0%	5 6.1%	31 37.8%	82 100%	9.2	.057
No Injury	232 51.6%	45 10.0%	32 7.1%	30 6.7%	111 24.7%	450 100.1%		
During the last month, I used my fingers to remove a lancet from a platform or holder.								
With Injury	22 26.8%	6 7.3%	15 18.3%	8 9.8%	31 37.8%	82 100%	15.3	.004*
No Injury	195 43.0%	33 7.3%	57 12.6%	70 15.5%	98 21.6%	453 100%		
When I recap I use one hand; I lay the needlecap on a flat surface and slide the needle tip in.								
With Injury	34 41.5%	8 9.7%	14 17.1%	8 9.7%	18 22.0%	82 100%	2.7	.61
No Injury	188 41.8%	49 10.9%	52 11.6%	63 14.0%	98 21.8%	450 100.1%		

* indicates significant finding
Percentages may not add to 100% due to rounding

Table 20 presents the findings for those items with sufficient numbers in each of the 5 cells to perform the analysis.

There was a significant relationship found between the frequency of recapping used needles and the occurrence of sharps injury within the preceding 12 months ($\chi^2=19.9$, $p=.0005$). From Table 20, a pattern is evident that a sharps injury is associated with home care nurses who recap sharps more frequently.

A significant relationship was also found between the frequency of using the fingers to remove a lancet from a holder and sharps injury ($\chi^2=15.3$, $p=.004$). From Table 20, it is apparent that those who use their fingers to remove a lancet from a holder are more likely to sustain a sharps injury. The relationship between frequency of recapping using two hands and the occurrence of sharps injury approached significance ($\chi^2=9.17$, $p=.057$). There was no relationship found between the frequency of use of one-handed recapping and the occurrence of sharps injury ($\chi^2=2.7$, $p=.61$).

For several of the recapping behaviors, there was a skewed distribution. As indicated in Table 21, categories with few numbers were collapsed and the data were presented as dichotomous variables: "yes" - those who rarely, sometimes, often, or almost always perform a

behavior, and "no" - those who never perform the behavior.

Relationships were then explored using the Chi-square statistic.

There were no significant relationships found between sharps injury and the three behaviors that were considered protective against sharps injuries: home care nurses who used a commercial hand shield, used needles with built-in shields, or used syringes with a cap that slid over the needle after use ($p > .05$). The relationship between sharps injury and home care nurses who bent, broke, or cut off used needles in the past month was not significant ($\chi^2 = 1.1$, $p = .29$), although home care nurses who practised this behavior were more likely to sustain a sharps injury.

Table 21. Relationship between Recapping and Sharps Injury using Dichotomous Variables

	Yes	No	n	χ^2	p
During the last month, I bent, broke or cut off used needles.					
With Injury	10 12.2 %	72 87.8%	82 100%	1.1	.29
No Injury	39 8.6%	416 91.4%	455 100%		
When I recap needles, I use a commercial hand shield.					
With Injury	2 2.4%	80 97.6%	82 100%	.98	.32
No Injury	22 4.9%	426 95.1%	448 100%		
I use needlecaps that have built in shields.					
With Injury	9 11.0%	73 89.0%	82 100%	.30	.58
No Injury	59 13.2%	389 86.8%	448 100%		
I use syringes that have built in caps that slide over the needle after use.					
With Injury	9 11.0%	73 89.0%	82 100%	.04	.84
No Injury	53 11.8%	398 88.2%	451 100%		

Very few home care nurses used the safer devices and several made unsolicited comments that they were unfamiliar with the products. Collectively, 506 of 530 (95.5%) home care nurses responding to the question indicated they never used a commercial hand shield for recapping used sharps. Similarly, 462 of 530 (87.2%) reported that they never used needlecaps with a built-in shield and 471 of 533 (88.4%)

reported they never used syringes with built-in caps that slide over the needle after use.

Sharps Injury and Disposal Behaviors

Table 22 and Table 23 show the relationship between frequency of disposal behaviors and whether or not home care nurses sustained one or more sharps injuries within the previous 12 months, using the Chi-square statistic. Table 22 presents the findings for those items with sufficient numbers in each cell to perform the analysis. No significant relationships were found between frequency of use of six disposal behaviors and home care nurses who did, and did not, sustain a sharps injury within the preceding 12 months.

Table 22. Relationship between Disposal Behaviors and Sharps Injury

	Never	Rarely	Sometimes	Often	Almost Always	n	χ^2	p
I dispose of used sharps in a commercial sharps container.								
With Injury	4 4.9%	4 4.9%	17 21.0%	10 12.3%	46 56.8%	81 99.9%		
No Injury	34 7.5%	37 8.2%	67 14.8%	68 15.0%	246 54.4%	452 99.9%	3.7	.46
The sharps container is not near me and I must carry the used sharp to dispose of it.								
With Injury	17 21.3%	18 22.5%	20 25.0%	11 13.8%	14 17.5%	80 100.1%		
No Injury	124 27.7%	109 24.3%	106 23.7%	59 13.2%	50 11.2%	448 100.1%	3.7	.48
I dispose of sharps in a container such as an empty bleach bottle that can penetrate.								
With Injury	31 38.3%	12 14.8%	21 25.9%	11 13.6%	6 7.4%	81 100%		
No Injury	143 31.6%	87 19.2%	111 24.5%	63 13.9%	49 10.8%	453 100%	2.5	.64
The sharps container is near by when I do the procedure.								
With Injury	2 2.5%	7 8.8%	12 15.0%	25 31.3%	34 42.5%	80 100.1%		
No Injury	24 5.3%	37 8.2%	77 17.0%	109 24.1%	205 45.4%	452 100%	2.8	.59
I have to place used sharps in containers that are too full.								
With Injury	19 23.8%	23 28.8%	34 42.5%	4 5.0%	0 0%	80 100.1%		
No Injury	139 30.7%	162 35.8%	138 30.5%	10 2.2%	4 0.9%	453 100.1%	7.8	.10
First, I have to disassemble equipment, e.g., lancet from a holder or IV equipment.								
With Injury	16 20.0%	9 11.3%	16 20.0%	16 20.0%	23 28.8%	80 100.1%		
No Injury	105 23.2%	67 14.8%	109 24.1%	88 19.4%	84 18.5%	453 100%	4.9	.30

Percentages may not add to 100% due to rounding

Table 23 shows the relationship between disposal behaviors and sharps injury using collapsed variables. The variables were collapsed because there was a skewed distribution for these disposal behaviors which resulted in several of the cells having small numbers.

The variable related to disposal of used sharps immediately after use was initially collapsed into three categories: those who never, rarely, and sometimes; those who often; and those who almost always dispose of a used sharp immediately after use. With the variable collapsed in this manner, a significant relationship was found between disposal of used sharps immediately after use and the occurrence of sharps injury within the preceding 12 months ($\chi^2=6.2$, $p=.05$). However the collapsed category for never, rarely, and sometimes contained only three observations and it was difficult to interpret the pattern in a meaningful way. Consequently, the variable was again collapsed, this time into two categories: those who never, rarely, sometimes, and often performed the behavior, and those who almost always dispose of the used sharp immediately after use. When the variable was collapsed into two categories in this way, the relationship between the disposal of used sharps immediately after use and the occurrence of sharps injury was no longer significant.

For the variable related to the disposal of used sharps in the client's garbage, the collapsed categories are: never; rarely; and sometimes, often, and almost always. For the variable related to disposal of used sharps in containers that are too full, the collapsed categories are: never; rarely; sometimes; and often and almost always.

Table 23. Relationship between Disposal Behaviors and Sharps Injury using Collapsed Variables

Injury Using Sharps Containers				n	χ^2	p
	Never, Rarely Sometimes and Often	Almost Always				
I dispose of used sharps immediately after use.						
With Injury	18 22.5%	62 77.5%		80 100%	.1	.77
No Injury	109 24.0%	345 76.0%		454 100%		
				n	χ^2	p
	Never	Rarely	Sometimes to Almost Always			
I dispose of used sharps in the client's garbage.						
With Injury	59 73.8%	15 18.8%	6 7.5%	80 100.1%	3.8	.15
No Injury	375 82.6%	52 11.5%	27 5.9%	454 100%		
				n	χ^2	p
	Never	Rarely	Sometimes	Often to Almost Always		
I dispose of used sharps in containers that are too full.						
With Injury	19 23.8%	23 28.8%	34 42.5%	4 5.0%	80 100.1%	5.9 .12
No Injury	139 30.7%	162 35.8%	138 30.5%	14 3.1%	453 100.1%	

Percentages may not add to 100% due to rounding

The relationship between sharps injury and each of the latter 2 variables

was not statistically significant. In summary, no significant relationships were found between the disposal behaviors and sharps injury.

Sharps Injury and Transportation Behaviors

Subjects were asked how frequently they used six different methods to transport used sharps. Cross-tabulation was used to compare the frequency of using the different transportation behaviors and whether home care nurses did, or did not, sustain a sharps injury within the preceding 12 months. The Chi-square statistic was used to determine significance. Only one of the behaviors is reported using the 5 point Likert scale (Table 24). There was no association between increased frequency of transporting used sharps in a commercial container with a lid that can be securely fastened and the occurrence of sharps injury within the preceding 12 months.

Table 24. Relationship between Transportation Behaviors and Sharps Injury

	Never	Rarely	Sometimes	Often	Almost Always	n	χ^2	p
I transport used sharps in a commercial container with a lid that can be securely fastened.								
Injury	23 28.4%	6 7.4%	8 9.9%	9 11.1%	35 43.2%	81 100%	2.6	.62
No Injury	164 36.7%	32 7.2%	36 8.1%	35 7.8%	180 40.3%	447 100.1%		

Percentages may not add to 100% due to rounding.

The data for sharing a nursing bag with other nurses who leave used sharps in the bag were skewed in that most nurses did not engage in this behavior. This resulted in several cells with very small numbers. Categories with few numbers were collapsed and the data were presented as dichotomous variables. The two categories for the behavior of sharing a bag with other nurses are: "yes" - those who perform the behavior rarely, sometimes, often, and almost always; and "no" - those who never perform the behavior. The relationship was then explored using the Chi-square statistic and a significant relationship was found ($\chi^2=6.6$, $p=.01$). The pattern from the crosstab suggests that sharing a bag with another nurse who leaves used needles in it is associated with increased risk of sharps injury. The finding is presented in Table 25.

Table 25. Relationship between Transportation Behaviors and Sharps Injuries using Dichotomous Variable

	Yes	No	n	χ^2	p
I share my bag with other nurses who leave used needles in the bag.					
With Injury	15 18.8%	65 81.3%	80 100.1%	6.6	.01*
No Injury	41 9.1%	408 90.9%	449 100%		

Percentages may not add to 100% due to rounding

* indicates significant finding

Because the data for four other behaviors related to transportation of used sharps were skewed, these cells also were collapsed and recoded.

The behaviors were recoded into 3 categories and are presented in Table 26 as those which are never, rarely, or "more commonly" (sometimes, often or almost always) performed. Using this recoding, no other factor related to the transportation of used sharps was significant.

Table 26. Relationship between Transportation Behaviors and Sharps Injuries using Collapsed Variables

	Never	Rarely	More Commonly	n	χ^2	p
I transport used sharps in a commercial container without the lid-securely fastened.						
With Injury	57 71.3%	9 11.3%	14 17.5%	80 100.1%	2.3	.31
No Injury	340 76.1%	56 12.5%	51 11.4%	447 100%		
I transport used sharps in a container that can be penetrated, such as an empty bleach bottle.						
With Injury	57 71.3%	14 17.5%	9 11.3%	80 100.1%	2.3	.32
No Injury	348 77.3%	52 11.6%	50 11.1%	450 100%		
I transport used sharps in a container that could break, such as a glass bottle.						
With Injury	67 83.8%	8 10.0%	5 6.3%	80 100.1%	3.3	.19
No Injury	397 88.4%	22 4.9%	30 6.7%	449 100%		
I transport used sharps loosely in my nursing bag.						
With Injury	60 75.0%	16 20.0%	4 5.0%	80 100%	4.3	.17
No Injury	362 80.8%	53 11.8%	33 7.4%	448 100%		

Percentages may not add to 100% due to rounding

CHAPTER V

DISCUSSION

The purpose of this study was to obtain information regarding the incidence of and factors related to sharp injuries sustained by home care nurses working in the community and to examine the relationship between recapping, disposal, and transportation of used sharps and sharps injuries in home care nurses. In this chapter, a summary of the significant findings will be presented: the incidence of sharps injuries in home care nurses in Alberta, the relationship between recapping and handling sharps after use, the relationship between disposal of used sharps and sharps injury, the relationship between transportation of used sharps and sharps injury, and organizational and contextual factors related to the occurrence of sharps injuries. The findings are discussed in relation to other studies of factors related to sharps injuries. As well, the limitations of this study and the recommendations for future study are addressed. The chapter concludes with implications for nursing practice.

A Description of Sharps Injuries in Home Care Nurses

The frequency of sharps injuries sustained by home care nurses is lower than the frequency reported for nurses working in acute care facilities. In this study, 46.4% reported they had sustained a sharps injury

at some time during their career; 15.1% of home care nurses reported a sharps injury within the previous 12 months. This annual rate is lower than the annual rate of 22.7% of sharps injuries from used needles reported in the Alberta survey of nurses (Alberta Health, 1992). The annual incidence is also lower than the yearly rate of 24% found in nurses and other health care workers in a survey of those involved in direct care in hospitals, emergency rooms, and in-patient services (Hersey & Martin, 1994). Moreover, the rate of 0.27 sharps injuries per full-time year of home care nursing employment found in this study is lower than the rate of 0.98 that Robert and Bell (1994) reported for nurses working on a medical ward.

The risk of sharps injury in home care nurses is probably lower than the risk cited for nurses working in acute care settings for two reasons. First, home care nurses are less likely to provide care in emergencies. Second, home care nurses are likely to perform a smaller number of invasive procedures routinely. Nevertheless, the risk in home care nurses is substantial because more than one in four home care nurses working full-time can anticipate a sharps injury annually. Further, this risk may become even higher as the delivery of services provided in the community grows rapidly and the types of services offered become increasingly complex and

invasive (White, 1992).

In this study, 48 of 82 (59.3%) home care nurses who stated they sustained a sharps injury within the preceding 12 months did not report it. This rate of under-reporting is slightly lower than that reported by Hamory (1983) for nurses and other employees working in a University hospital setting, by Skillen (1992) for public health nurses, and from the survey of Alberta nurses (Alberta Health, 1992). One of the reasons that nurses, particularly those who are immunized against hepatitis B, may not report their sharps injuries is the absence of measures of proven efficacy to prevent HCV and HIV. Skillen (1992) questions whether under-reporting of sharps injuries may be due to a negative organizational reaction, such as stigmatizing those who sustain sharps injury.

In this study, the two most commonly reported reasons for not reporting sharps injuries related to home care nurses' perception of susceptibility: 18 home care nurses did not think the sharps injury important, followed closely by 17 who stated that they had received hepatitis B vaccine. Reutter and Northcott (1995), in a study of nurses who had received exposure to HIV-infected fluid, also found that nurses may minimize the risk of infection following sharps injuries. Most of the other reasons given for not reporting sharps injuries were related to

organizational issues: the reporting procedure takes too much time, being unaware of the reporting procedure, being fearful of reprimand, and perceiving that the policy about sharps injuries discourages reporting.

Skillen (1996) states that organizational factors cannot be separated from the risk that nurses perceive in their environment. In this study, 13 home care nurses who sustained a sharps injury within the preceding 12 months did not report their injury because they were embarrassed or for personal reasons. Failure to report for this reason may be a way to preserve the nurses' professional self-esteem if they perceive that sharps injuries are preventable and reflect on the nurses' professional conduct (Reutter & Northcott, 1995).

Recapping of Used Sharps

Home care nurses work in unstructured environments and may provide care in an improvised manner. They may also perform procedures more or less commonly than their colleagues who work in institutional settings. In this study, home care nurses reported that they performed glucose testing more frequently than any other invasive procedure. Overall, nearly 40% of respondents used their fingers to remove a used lancet. Removing a used lancet from a holder was the procedure most commonly reported by home care nurses as implicated in the sharps injuries they

incurred. More than one quarter of all sharps injuries were sustained while removing a lancet from a holder. Moreover, there was a significant relationship between frequency of using the fingers to remove a used lancet from a holder and sustaining a sharps injury.

By comparison, less than 10% of the sharps injuries reported by nurses in the Alberta survey were related to the use of a lancet (Alberta Health, 1992). The difference may be explained by the fact that a random sample of all Alberta nurses were surveyed, the majority of whom would be employed in acute care institutions. Home care nurses probably use lancets to obtain blood for glucose monitoring more than any other group of nurses, while performing less frequently other procedures using sharps. However, Bowden et al. (1993) found that sharps injuries were twice as likely to be caused by lancets as by needles; Eisenstein and Smith (1992) also reported a higher rate of injuries associated with lancets.

Almost as many home care nurses reported recapping a used needle when a sharps injury occurred as those who reported removing a used lancet from a holder. More than one quarter of sharps injuries occurred in conjunction with recapping. This finding is similar to that reported by Hersey and Martin (1994) in an American survey of health care workers. Likewise, just under 25% of nurses from the Alberta survey sustained a

sharps injury from recapping (Alberta Health, 1992). Despite the sanction for more than a decade that needles not be recapped, the frequency of sharps injury that occurred in conjunction with recapping in this study is more than three times the 7.9% rate documented in nursing personnel from 1975 to 1979, and nearly twice the 14.2% rate reported in nurses between 1987 and 1988 (McCormick et al., 1991).

In this study, less than half of respondents indicated that they often or almost always recapped used needles in the previous month. There was a significant relationship found in the correlational analysis between increased frequency of recapping and sharps injuries incurred within the preceding 12 months. The relationship found between two-handed recapping and the occurrence of sharps injury in this study approached significance; other researchers have reported a significant association (Tait & Tuttle, 1994).

The one-handed method of recapping has been described as a safe method for recapping used needles (Dalton et al., 1992; English, 1992) and has been recommended in place of the two-handed method (Tait & Tuttle, 1994; Wright & Farrer, 1993). The safety of the one-handed method of recapping was not supported by this study; no association was found between increased use of this practice and sharps injury.

In this study, more than 90% of home care nurses did not use safer recapping devices such as needlecaps with built in shields, syringes with built in caps, or commercial hand shields to protect them from injury.

Several home care nurses made anecdotal comments that they were either unfamiliar with the devices or that the devices were not available.

Mendelson et al. (1993) estimated that needle devices that are activated by the user could reduce between 17% and 28% of sharps injuries. Younger et al. (1992) reported a significant decrease in sharps injuries using a safety syringe with a shield.

Disposal of Used Sharps

There were no behaviors related to the disposal of used sharps that were significantly associated with sharps injury.

In the set of questions pertaining to recapping behaviors, there was a significant relationship found between the increased frequency of removing a used lancet from a holder and sharps injury. However, in a similar question in the set pertaining to disposal behaviors, no significant relationship was found between sharps injuries and increasing frequency of disassembling equipment after its use, such as removing a lancet from a holder, or dismantling intravenous equipment. This is somewhat surprising given that the most frequently performed activity at the time of sharps

injury in this study was removing a lancet from a holder.

The effect of the placement of the sharps container on sharps injuries in acute care facilities has been studied by several researchers (Haiduven et al., 1992; Krasinski et al., 1987; Linnemann et al., 1991; Ribner et al., 1987;); only Haiduven et al. (1992) found that placing sharps containers in readily accessible areas resulted in a significant decrease in sharps injuries. In a case-control study of sharps injuries related to disposal of used sharps, Weltman et al. (1995) actually found a significant increase in the number of sharps injuries if the sharps disposal container was less than 5 feet away, compared to containers located between 5 to 15 feet, or more than 15 feet away.

Transportation of Used Sharps

There was a significant relationship between those who did, and did not, share their nursing bag with another nurse and the occurrence of a sharps injury within the preceding 12 months. Although the direction of the association cannot be determined from the Chi-square statistic, the cross-tabulation pattern suggests that the practice of sharing a nursing bag appears to be hazardous. This finding has not been reported previously. However, the risk in sharing a nursing bag with other nurses who leave used needles in the bag may be likened to other situations involving the

transportation of used sharps. Jagger et al. (1988) described a risk for housekeeping staff in hospitals who transport trash in which used sharps have been placed. English (1992) reported that 7% of sharps injuries in hospitals were related to handling dirty linen and emptying trash.

Several nurses noted on their questionnaires that they never transport used sharps from the homes of their clients. Further, there is a substantial difference between the frequency of respondents who dispose of used sharps in a container, such as an empty bleach bottle that can be penetrated, compared to those who transport used sharps in them. Nearly one quarter of respondents reported that they often or almost always disposed of used sharps in a container that could be penetrated, but only just over 5 per cent transported used sharps in this type of receptacle. This suggests that the risk of sharps injury from used sharps disposed of in this manner is not to the home care nurse but rather to another worker, likely those employed to collect garbage from these residences.

Other Factors Related to Sharps Injury

There was a statistically significant relationship between having a policy and the occurrence of sharps injury in eight of the thirteen policies discussed. Although the direction of the relationship cannot be determined from the Chi-square statistic, the frequencies in the table suggest that for

the most part comprehensive policies are protective against sharps injuries. Having policies regarding the transporting of sealed sharps containers from the client's home, reporting of sharps injuries during the day or after hours, drawing blood promptly for testing from the exposed staff, post-exposure counselling for both the exposed staff and the client, and having a protocol for hepatitis B immune globulin were all significantly related to the occurrence of sharps injuries. Having policies regarding the recapping of needles, the level of filling of sharps containers, hepatitis B immunization for staff, and obtaining consent to test the client were not significantly related to the occurrence of sharps injury. It is possible that these policies are common and not indicative of a comprehensive set of policies for the prevention of sharps injuries. The relationship between having a policy for the use of puncture-resistant sharps containers approached significance; however, the presence of this policy was associated with increased risk of injury.

The findings suggest that a comprehensive approach in setting policies regarding sharps injuries may be an effective preventive measure. Hersey and Martin (1994) stated that hospital policies must not only be set but must also be actively communicated in order to be effective in preventing sharps injuries.

If policies to prevent sharps injuries are an effective preventive measure, then it is of concern that a large number of home care nurses were unaware whether policies existed. More than half of respondents in this study were unsure about post-exposure management of sharps injuries, including whether a policy existed for obtaining the client's consent for post-exposure testing, drawing blood promptly from the source, post-exposure counselling for the exposed staff, post-exposure counselling for the client, or a protocol for hepatitis B immune globulin in the event of exposure. Although it is encouraging that fewer nurses reported being unaware of policies that would prevent sharps injuries, post-exposure management is important, given the immediacy with which this management should be initiated when a sharps injury occurs.

There was no statistical significant relationship between home care nurses who actually had, or had not, been immunized against hepatitis B and the occurrence of sharps injury. However, there was a significant relationship between the belief that hepatitis B vaccine costs too much money and the occurrence of sharps injury. The pattern from the cross-tabulation suggests that home care nurses who sustained a sharps injury within the preceding 12 months were more likely to believe that the hepatitis B vaccine was too expensive. Further, the relationship between

the respondents' belief that they may become infected with HBV and sharps injury approached significance.

There was a significant relationship between respondents' belief that they may become infected with HCV and sharps injury. The pattern from the cross-tabulation suggests that home care nurses who sustained a sharps injury were more likely to believe they may become infected. There was a statistically significant relationship between respondents' belief that home care nurses have a risk of becoming infected with HIV on the job and the occurrence of sharps injury. There was also a statistically significant relationship between respondents' belief that they may become infected with HIV and sharps injury. In both cases, the pattern from the cross-tabulation suggests that those who had sustained the sharps injury were more likely to feel susceptible.

Williams et al. (1994) contend that the Health Belief Model is a useful mid-range theory to apply to health care workers who are potentially exposed to bloodborne infections. They state that compliance with preventive measures is likely to be low if workers perceive that their risk of infection is insignificant. Williams et al. (1994) address primarily the components of perceived susceptibility and the barriers to preventive behavior from the Health Belief Model and do not address the other three

components of the Model: the perceived seriousness of the disease, the perceived efficacy of the preventive intervention, and perceived self-efficacy (Rosenstock et al. 1988).

In this study, the degree of perceived self-efficacy of hepatitis B vaccine to prevent infection did not differentiate those who sustained sharps injury from those who did not. Likewise, knowledge of transmission of HBV was not significantly different in those with, and without, injury. As well, with HIV the degree of perceived self-efficacy, captured in questions such as: "I know how to protect myself", and "there's little you can do to prevent...HIV" did not differentiate home care nurses who did, and did not, sustain sharps injuries.

It is difficult to assess the significance of perceived risk in preventing sharps injuries in a retrospective study, because the perceived risk may be altered as a consequence of the variable of interest, in this case, the sharps injury. That is, nurses may feel more susceptible after they have had a sharps injury. On the other hand, those who feel more susceptible may be more careful and consequently be less likely to sustain an injury. Rosenstock (1974) claims that a prospective design is better than a retrospective one for testing the Health Belief Model.

Home care nurses tend to work in unstructured environments,

which may influence the potential for injury. The factor most often implicated by nurses who sustained a sharps injury was that of being rushed, which accounted for 44% of all responses. Williams et al. (1994) found that the most important barrier to using precautions was lack of time. In this study, nearly 12% reported that it was often or almost always difficult to perform invasive procedures when the client lay in a bed or sat on furniture that could not be adjusted. More than one third of respondents stated that they often or almost always had to assume awkward positions to provide care because of limited space or unsuitable furniture. Having to assume awkward positions was implicated in more than a fifth of responses related to the contextual factors surrounding actual sharps injuries. As well, about 15% of implicated factors related to the fact that furniture was inadequate as a working space.

Less than 2% of respondents stated that there was never or rarely adequate lighting available to provide nursing care. However, 8% who sustained a sharps injury within the preceding 12 months cited inadequate lighting as a contextual factor at the time of the injury. More than 20% stated that they often, or almost always, had disturbances from family, visitors, or pets when performing invasive procedures. These disturbances may unsettle not only the nurse but also the client; in this study,

movement of the client was mentioned as a contextual factor by 9% of home care nurses who sustained a sharps injury within the preceding 12 months. Environmental factors that are present in the home and that may affect the occurrence of sharps injuries have not previously been reported.

In this study, the occurrence of sharps injuries was not affected by level of education, year of graduation, number of years worked, nor by the average number of hours worked weekly. Similarly, Weltman et al. (1995) found no differences between cases and controls for the variables of age, gender, years worked in occupation, or full-time versus part-time employment.

In summary, 15.1% of respondents in this study reported a sharps injury within the preceding 12 months. Recapping behaviors that were significantly associated with sharps injury in this study were removing a used lancet from a holder and recapping a used needle. There were no disposal behaviors that were significantly associated with sharps injury. Sharing a nursing bag with a colleague was a transportation behavior that was significantly associated with sharps injury. Sharps injuries were also related to selected policies regarding sharps injuries, and to nurses' concerns about contracting HIV and HCV infection.

Limitations of the Study

1. **Response rate.** The response rate for this survey was at least 63.4%. It is a limitation of this study that of the 1031 home care nurses who were sent a questionnaire, the number who did not receive it is unknown because the company hired to mail the questionnaire refused to affix a return address to the envelopes. Moreover, of those who did receive the questionnaire, it is probable that respondents are more likely to be interested in the topic than those who did not reply, thus reducing the representativeness of the sample (Fowler, 1993). It is not known whether or not respondents differ from non-respondents in terms of behaviors and sharps injury.
2. **Generalizability to Other Geographic Regions.** Home care programs have evolved differently in the provinces of Canada and the risk of sharps injuries may differ for home care nurses working in different jurisdictions. This difference may be related to the acuity of care provided, which would influence the types of procedures performed. As well, different jurisdictions may use different equipment, such as lancets that are not placed in a holder, and consequently do not require manipulation after use. This study was conducted in the province of Alberta during a period when major

restructuring of the health care system was occurring. It is possible that these major changes had an effect upon staffing patterns in home care agencies that could, for example, result in nurses being more rushed while performing invasive procedures.

3. **Use of a list to obtain the sample.** The A.A.R.N. membership list was considered the most efficient means for obtaining the sample. However, the list may not have been entirely accurate when used.
4. **Recall bias.** The quality of answers from home care nurses who sustained a sharps injury within the preceding 12 months may differ from those who did not. Those subjects who have sustained sharps injuries may contemplate their answers at length compared to those who have not, particularly if they are worried they may have acquired a bloodborne infection. This type of bias is problematic in retrospective studies (Hennekens & Buring, 1987).
5. **Questionnaire for the Study.** The majority of the questions in the data collection instrument were developed by the researcher for this study. Less than half of the questions in the questionnaire were modified from existing tools. None of the questions had established validity and reliability. All of the

component parts of the three questions related to recapping, disposal, and transportation were original. The reliability coefficients for all three indexes were low and none could be used as measures.

Recommendations for Future Study

This study examined the relationship between selected behaviors and the occurrence of sharps injuries. Further study is indicated to examine how perception of risk and policies related to sharps injuries influence the behaviors of recapping, disposal, and transportation. A causal model could be used to determine the direct and indirect paths by which these factors influence the occurrence of sharps injuries.

Further study is also indicated into the development of a valid and a reliable tool. In this study, less than half of the questions were adapted from two existing tools, and in neither case was the validity and reliability of the tool reported. Failure to find relationships may have been due, at least in part, to measurement issues associated with the tool.

This study points out the need to explore more specifically what happens to nurses after they sustain a sharps injury. As many nurses reported they were unaware of policies related to post-exposure management of sharps injuries, further study should be undertaken to

determine how many nurses receive counselling, testing, and appropriate prophylaxis following sharps injuries. A qualitative design could be used to improve our understanding of nurses' responses to sharps injuries.

Further research into other groups providing health services in the community, such as mental health nurses who administer injections to clients in their homes, is also needed. There may be an even greater urgency to evaluate the risks for nurses working in other community settings. This need was outlined eloquently by the nurse employed by an insurance company who commented that she/he did not report the sharps injury because she/he believed that the employer "couldn't care less about my welfare".

Implications for Nursing Practice

There are many implications for nursing practice based on the results of this study. First, improved measures are needed to ensure that there are policies regarding the prevention and reporting of sharps injuries and that these policies are communicated to all staff. As a minimum, a discussion of sharps policies with home care nurses should occur during their orientation program, and this information should be reinforced periodically through inservice education. Increased educational efforts are needed to dispel the misconceptions that sharps injuries are not important

and that reporting is unnecessary if a nurse is immunized against hepatitis

B. The reporting procedure should be expedient to overcome the obstacle that reporting of sharps injuries takes too much time.

Second, an organizational approach is indicated to address the climate of an agency if home care nurses believe they may be reprimanded for reporting a sharps injury, or are too embarrassed to report it. Similarly, the climate must be evaluated if home care nurses believe the agency policy discourages the reporting of sharps injuries. Hepatitis B vaccine is now available, without charge, from Alberta Health for all health care workers who provide direct care to clients (J. R. Waters, personal communication, March 19, 1996). Employers should ensure that hepatitis B vaccine is made available to all susceptible nursing employees.

There are also implications regarding the availability and the utilization of safer sharps devices. Employers should ensure that safer sharps devices are provided and that nurses are instructed regarding their use. Several nurses made anecdotal comments that they were unfamiliar with commercial hand shields, needlecaps that have a built-in shield, and syringes with caps that slide over the needle after use. The needleless IV-access systems are an example of a product for which improved safety has been demonstrated (Beason et al., 1992; D'Arco & Hargreaves, 1995;

Dugger, 1992; Gartner, 1992; Rutowski & Peterson, 1993; Skolnick et al., 1993; Prince et al., 1994; Yassi et al., 1995). A needleless IV access system should be available to home care nurses administering home IV programs.

There are lancets available on the market that do not require a holder for use and that retract into their plastic casing once pressure is released. These lancets are similar in cost to those currently used by nurses and should be recommended as a safer product for obtaining blood for glucose testing, given that this procedure was not only the most frequently performed invasive procedure but also the most implicated in sharps injuries incurred by nurses in this study.

Third, the provision of safer sharps designs and needleless IV systems may be even more important for home care nurses working in an unstructured environment than it is for their colleagues working in hospital settings. More than 20% of nurses in this study stated they were disturbed often, or almost always, by family, visitors, or pets when they were performing invasive procedures. More than one third reported having to assume awkward positions often, or almost always, to provide care because of limited space or unsuitable furniture. Environmental factors such as these are not always readily modifiable; hence engineering approaches are needed. However, it may also be beneficial to consult with a specialist in

ergonomics who could make recommendations regarding other measures that could be taken to prevent injuries. Such measures may include assuming safer positions when performing invasive procedures when space is limited or the furniture cannot be adjusted.

In regards to recapping, neither two-handed or one-handed recapping should routinely be recommended on the basis of this study. One-handed recapping should be done only when there is not a safer alternative.

There are no clear recommendations for changes in nursing practice related to disposal behaviors that can be made on the basis of this study. In relation to transportation behaviors, the use of a nursing bag to carry equipment is a practice unique to nurses working in the community and its associated risk with sharps injury has not been described previously. It appears prudent to recommend that every home care nurse have his or her own nursing bag pending further study. However, this may not be a practical solution for those home care nurses who work infrequently. For home care nurses who work infrequently and share a nursing bag, it may be necessary to institute a policy that used sharps not be transported in the nursing bag.

Finally, the findings of this study should be disseminated to

increase the awareness of the risk of sharps injuries and the measures that can be taken to prevent them. An oral presentation at a conference for home care nurses or an article submitted to a nursing journal that is distributed widely, such as *The Canadian Nurse*, should be considered. To reach those who make the decisions regarding the purchase of materials for use in health care settings, an article could be published in a journal of health care management. Consideration should also be given to the submission of an article for publication in an occupational health or an infection control journal to reach those nurses who are responsible for the prevention and control of sharps injuries.

The implications for nursing practice outlined above emanate from a study of the incidence of, and factors related to, sharps injuries in home care nurses, conducted during 1995 in Alberta. It is not possible to prevent the occupational transmission of all bloodborne infections with our current knowledge. However, with the cooperative efforts of home care nurses, employers, industry, and scientists, greatly improved control can be achieved. Nurses are willing to care for potentially infected clients when they find purpose in their work (Reutter & Northcott 1993) but they are entitled to care for their clients in the safest environment that can reasonably be created.

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APPENDIX A: COVERING LETTER**Sharps Injury Study**

September 5, 1995

Dear Colleague,

Home care nurses may be at higher risk of sharps injuries because they work in an unstructured environment. However, I know from my work as a Nurse Epidemiologist, that almost nothing is known about the risks of sharps' injuries in the home setting. The risk may increase as home care nurses provide more invasive therapy, such as intravenous therapy. It is critical that the factors related to sharps injuries be described. Sharps injuries are the most common injury for nurses in the workplace. In an occupational setting, sharps injuries are the primary means for transmitting hepatitis B virus, hepatitis C virus, and human immunodeficiency virus.

I am also a graduate nursing student at the University of Alberta. Currently, I am conducting a study on sharps injuries sustained by home care nurses in Alberta, entitled "The relationship between recapping, disposal, and transportation of used sharps and sharps injuries sustained by home care nurses in Alberta". The study is supported by the Laboratory Centre for Disease Control in Ottawa.

The purpose of the study is to describe the factors that are related to the sharps injuries sustained by home care nurses. The Alberta Association of Registered Nurses (A.A.R.N.) has agreed to code and to mail this questionnaire to all home care nurses in Alberta for me. The role of the A.A.R.N. is simply to distribute, but not endorse, the questionnaire. Completed questionnaires will be returned to, but not opened by, the A.A.R.N. All returned envelopes containing the completed questionnaire will be opened by myself.

I can foresee no risk to you in answering this questionnaire, unless it arouses unpleasant memories of previous sharps injuries you may have received. Your response will be anonymous. I will discuss the results of the survey in my thesis and will submit the findings for publication. However, I will discuss only grouped data and will not use any information that could identify individuals or specific organizations. The data will be kept in a locked cupboard for possible future analysis by Anita Hanrahan for at least seven years before it is destroyed. However, before the data is studied again I will obtain permission from the appropriate ethical review committee.

There are no direct benefits to you for participating. However, one benefit that may result from the study is an understanding of the factors related to sharps injuries in the home care setting. This understanding may lead to the development of measures to prevent sharps' injuries. Ultimately, this would reduce the transmission of hepatitis B, hepatitis C, and human immunodeficiency virus in the workplace.

Your response will contribute to the understanding of factors associated with sharps' injuries. If you are willing to participate in the study, please complete the attached questionnaire and return it to the A.A.R.N. by **September 30, 1995** in the enclosed, stamped envelope. Return of a complete questionnaire will be accepted as consent to participate in the study. The questionnaire should take about 15 to 20 minutes to complete. **PLEASE DO NOT MARK YOUR NAME ON ANY PART OF THE QUESTIONNAIRE.**

If you have any questions or concerns, please call me at 427-2644 during working hours or 481-2379 after hours. If you prefer to write to me, my address is:

31 Gariepy Crescent
Edmonton, Alberta
T6M 1B5

You are also welcome to contact the supervisor for my thesis, Dr. Linda Reutter, Associate Professor of Nursing. Dr. Reutter's telephone number at the Faculty of Nursing at the University of Alberta is 492-5909 and her address is:

3-129 Clinical Sciences Building
Edmonton, Alberta T6G 2G3

Thank you for considering my invitation to complete the questionnaire.

Yours truly,

Anita Hanrahan, RN BN
MN Candidat



This study focuses on the relationship between sharps injuries sustained by home care nurses in Alberta and the recapping, disposal, and transportation of used sharps. I invite home care nurses who provide direct care to clients to complete this questionnaire.

If you do not provide direct care to clients, please check the box below. Then return the unanswered questionnaire to the Alberta Association of Registered Nurses in the enclosed, stamped envelope. Thank you very much for your help.

☐ I do not provide direct care to clients.



QUESTIONNAIRE ON SHARPS INJURIES

The purpose of this questionnaire is to collect information on the incidence of and factors related to sharps injuries in home care nurses. Specifically, I am interested in sharps injuries that may result in the transmission of a bloodborne infection. In this questionnaire, a sharps injury is defined as a penetrating injury of the skin by a used needle or other sharp instrument, such as a lancet, that is potentially contaminated with another individual's blood or body fluids.

The first four questions relate to your hepatitis B immunization status.
(Please circle the number of your answer.)

Q - 1. Have any of your employers ever offered hepatitis B vaccine to you?

- 1 NO
- 2 YES

Q - 2. At your place of employment, is the hepatitis B vaccine available to unimmunized employees free of charge?

- 1 NO
- 2 YES

Q - 3. Have you ever been vaccinated against hepatitis B?

- 1 NO
 - 2 YES
- (PLEASE PROCEED TO QUESTION 5)

Q - 4. How many doses of hepatitis B vaccine did you receive?

- 1 ONE
- 2 TWO
- 3 THREE
- 4 MORE THAN THREE
- 5 I DON'T KNOW

Q - 5. Physical Environment. Please circle the number that most accurately reflects how often you face the following situations.

- | NEVER | RARELY | SOME-TIMES | OFTEN | ALMOST ALWAYS |
|-------|--------|------------|-------|---------------|
| 1 | 2 | 3 | 4 | 5 |

There is adequate lighting available for me to provide nursing care to my clients in their home.

5

It is difficult for me to perform invasive procedures, such as injections, when the client lies in a bed or sits on furniture that cannot be adjusted.

5

When working alone, I can provide care to agitated clients without increased risk of personal injury.

5

Q - 5. (continued)

NEVER RARELY SOME-TIMES OFTEN ALMOST ALWAYS

I have to assume awkward positions to provide nursing care because of limited space or unsuitable furniture.

The area I use for laying out my equipment is convenient for working.

I may be disturbed by family members, visitors, or pets when I give an injection, take a glucometer reading, or perform other invasive procedures.

Q - 6. Procedures. Please indicate how often you perform the following procedures in an average week.

Blood glucose testing	<u>TIMES PER WEEK</u>
Venipuncture	<u>TIMES PER WEEK</u>
Starting a hypodermoclysis line	<u>TIMES PER WEEK</u>
Discontinuing a hypodermoclysis line	<u>TIMES PER WEEK</u>
Intramuscular injections	<u>TIMES PER WEEK</u>
Subcutaneous injections	<u>TIMES PER WEEK</u>
Intradermal injections	<u>TIMES PER WEEK</u>
Starting an intravenous	<u>TIMES PER WEEK</u>
Discontinuing an intravenous	<u>TIMES PER WEEK</u>
Adding medication to an intravenous line	<u>TIMES PER WEEK</u>

Q - 7. Recapping Needles and Handling Used Sharps

The following statements concern the handling of used needles and other sharps. (Please circle the answer that shows how often you handle used sharps in the ways described.)

	NEVER	RARELY	SOME-TIMES	OFTEN	ALMOST ALWAYS
During the last month, I recapped used needles.	1	2	3	4	5
During the last month, I bent, broke, or cut off used needles.	1	2	3	4	5
When I recap a needle I use both hands -- I hold the needlecap in one hand and use the other hand to insert the needle into the cap.	1	2	3	4	5
During the last month, I used my fingers to remove a lancet from a platform or holder	1	2	3	4	5

Q - 7. (continued)

	NEVER	RARELY	SOME-TIMES	OFTEN	ALMOST ALWAYS
When I recap needles I use a commercial hand shield to protect my hand from injury.	1	2	3	4	5
I use needlecaps that have built in shields.	1	2	3	4	5
I use syringes that have built in caps that slide over the needle after use.	1	2	3	4	5
When I recap a needle I lay the needlecap on a flat surface and slide the needle tip into the cap (without using my hands to hold the needlecap).	1	2	3	4	5

Q - 8. Disposal of Sharps

The next statements refer to the method of disposal of used sharps in the home.
(Please circle the number that reflects how often you do the following activities.)

NEVER RARELY SOME- TIMES OFTEN ALMOST ALWAYS
1 2 3 4 5

I dispose of used sharps in a commercial sharps container. 1 2 3 4 5

It is not convenient to place the sharps container near me and I must carry the used sharp to dispose of it. 1 2 3 4 5

I dispose of used sharps in a container such as an empty bleach bottle that can be penetrated by a needle or other sharp. 1 2 3 4 5

I dispose of used sharps immediately after use. 1 2 3 4 5

The sharps container is near by when I do the procedure. 1 2 3 4 5

Q - 8. (continued)

NEVER RARELY SOME- TIMES OFTEN ALMOST ALWAYS
1 2 3 4 5

I dispose of used sharps in the client's garbage. 1 2 3 4 5

I have to place used sharps in containers that are too full. 1 2 3 4 5

I have to disassemble equipment such as a lancet from a platform or intravenous equipment before disposal. 1 2 3 4 5

Q - 9. Transportation of Used Sharps

The next statements refer to transportation of used needles and other sharps from the home. (Please circle the number that shows how often you transport used sharps by the various methods stated.)

Q - 9. (continued)

NEVER 1 RARELY 2 SOME-TIMES 3 OFTEN 4 ALMOST ALWAYS 5

I transport used sharps in a commercial sharps container with a lid that can be securely fastened (and reopened on a subsequent visit).

1 2 3 4 5

I transport used sharps in a commercial sharps container without the lid securely fastened because the lid can be fastened only once.

1 2 3 4 5

I transport used sharps in a container that can be penetrated such as an empty bleach bottle.

1 2 3 4 5

I transport used sharps in a container that cannot be penetrated but could break such as a glass bottle.

1 2 3 4 5

I transport used sharps loosely in my nursing bag.

1 2 3 4 5

I share my nursing bag with other nurses who leave used needles in the bag.

1 2 3 4 5

10. While at work have you ever sustained one or more injuries from a used needle or sharp that pierced your skin? (Please check the appropriate box.)

1 YES --(PLEASE PROCEED TO THE NEXT QUESTION)
2 NO --(PLEASE PROCEED TO QUESTION 19)
3 UNCERTAIN --(PLEASE PROCEED TO THE NEXT QUESTION)

Q - 11. Have you sustained one or more injuries from a used needle or sharp that pierced your skin during the past twelve months? (Please circle the number for your answer.)

- 1 YES
2 NO

-(PLEASE PROCEED TO QUESTION 19)

Q - 12. How many sharps injuries have you received in the past twelve months?

NUMBER

Q - 13. Did you report the one or more sharps injuries you received during the past twelve months to your supervisor. (Please circle the number.)

- 1 YES, I REPORTED ALL - (PLEASE PROCEED TO QUESTION 15.)
2 I REPORTED ONE OR SOME, BUT NOT ALL THE SHARPS INJURIES
3 NO

Q - 14. If you chose not to report one or more injuries, please indicate the reason(s). (Please circle the number of ALL answers that apply.)

- 1 UNAWARE OF REPORTING PROCEDURE
2 REPORTING PROCEDURE TAKES TOO MUCH TIME
3 FEAR OF BEING REPRIMANDED
4 EMBARRASSED/PERSONAL REASONS
5 I HAVE HAD HEPATITIS B VACCINE
6 I DIDN'T THINK IT WAS IMPORTANT
7 IN MY AGENCY, THE POLICY ABOUT SHARPS INJURIES DISCOURAGES REPORTING
8 NEVER RECEIVED A SHARPS INJURY

Q - 15. This question refers to the time of day when your most recent sharps injury occurred. (Please circle the number of your answer.)

- 1 1st HOUR OF SHIFT
2 2nd HOUR OF SHIFT
3 3rd HOUR OF SHIFT
4 4th HOUR OF SHIFT
5 5th HOUR OF SHIFT
6 6th HOUR OF SHIFT
7 7th HOUR OF SHIFT
8 8th HOUR OF SHIFT
9 DO NOT RECALL

Q - 16. This question refers to the day of your shift when your most recent sharps injury occurred. (Please circle the number of your answer.)

- 1 1st DAY OF SHIFT
2 2nd DAY OF SHIFT
3 3rd DAY OF SHIFT
4 4th DAY OF SHIFT
5 5th DAY OF SHIFT
6 6th DAY OF SHIFT
7 7th DAY OF SHIFT
9 DO NOT RECALL

Q - 17. Sharps are used in the following activities which may have led to the one or more sharps injuries you received in the past twelve months. (Please circle the number of your answer. If you did receive an injury, please indicate how many.)

Recapping a used needle	1 NO	2 YES	HOW MANY INJURIES? _____
Bending, breaking or cutting off a used needle	1 NO	2 YES	HOW MANY INJURIES? _____
Using my fingers to remove a lancet from the holder	1 NO	2 YES	HOW MANY INJURIES? _____
Using my fingers to remove a used needle from a syringe	1 NO	2 YES	HOW MANY INJURIES? _____
Disposing of the used sharp into a container that was over-filled or had a needle protruding from it	1 NO	2 YES	HOW MANY INJURIES? _____
Transporting the used sharp from the client's home	1 NO	2 YES	HOW MANY INJURIES? _____

Q - 17. (continued)

Starting an intravenous line	1 NO	2 YES	HOW MANY INJURIES? _____
Adding medication into an intravenous line	1 NO	2 YES	HOW MANY INJURIES? _____
Discontinuing an intravenous line	1 NO	2 YES	HOW MANY INJURIES? _____
Starting a hypodermoclysis line	1 NO	2 YES	HOW MANY INJURIES? _____
Discontinuing a hypodermoclysis line	1 NO	2 YES	HOW MANY INJURIES? _____
Other _____			HOW MANY INJURIES? _____

Q - 18. Were any of the factors listed below related to the sharps injuries you received during the past twelve months? (Please circle the number of your answer and indicate how many injuries, if any, were due to the factor.)

The lighting was inadequate	1 NO	2 YES	HOW MANY INJURIES? _____
The furniture available was inadequate for a work space	1 NO	2 YES	HOW MANY INJURIES? _____
I had to assume an awkward position to perform the procedure	1 NO	2 YES	HOW MANY INJURIES? _____
I was rushed when I performed the procedure	1 NO	2 YES	HOW MANY INJURIES? _____
I was unfamiliar with the procedure	1 NO	2 YES	HOW MANY INJURIES? _____
The client moved unexpectedly during the procedure	1 NO	2 YES	HOW MANY INJURIES? _____

Q - 19. Questions on hepatitis B and hepatitis C viruses.
The following statements are about hepatitis B and hepatitis C.
(Please circle the number that best indicates how strongly you agree or disagree with these statements.)

	STRONGLY AGREE 1	AGREE 2	NO OPINION 3	DISAGREE 4	STRONGLY DISAGREE 5
Home care nurses are at significant risk of becoming infected with hepatitis B on the job.	1	2	3	4	5
I am concerned that I may become infected with hepatitis B on the job.	1	2	3	4	5
The most common means of transmitting hepatitis B in the workplace is by sharps injury.	1	2	3	4	5
The hepatitis B vaccine costs me too much money.	1	2	3	4	5

Q - 19. (continued)

	STRONGLY AGREE	AGREE	NO OPINION	DISAGREE	STRONGLY DISAGREE
1	2	3	4	5	
The hepatitis B vaccine is not effective.	1	2	3	4	5
The hepatitis B vaccine often causes bad side effects.	1	2	3	4	5
Personally, I am not at risk of hepatitis B on the job.	1	2	3	4	5
Home care nurses are at significant risk of becoming infected with hepatitis C on the job.	1	2	3	4	5
I am concerned that I may become infected with hepatitis C on the job.	1	2	3	4	5

Q - 20. Human Immunodeficiency Virus (HIV) Questions.

The following statements are about infection with HIV.
(Please circle the number that shows how strongly you agree or disagree with these statements.)

	STRONGLY AGREE	AGREE	NO OPINION	DISAGREE	STRONGLY DISAGREE
1	2	3	4	5	
Home care nurses have a significant risk of becoming infected with HIV on the job.	1	2	3	4	5
I am concerned that I may become infected with HIV on the job.	1	2	3	4	5
I know how to protect myself from exposure to HIV on the job.	1	2	3	4	5
Personally, I am not at risk of getting infected with HIV from a sharps injury.	1	2	3	4	5

Q - 20. (continued)

STRONGLY AGREE AGREE NO OPINION DISAGREE STRONGLY DISAGREE

1 2 3 4 5

HIV infection cannot be treated effectively.	1	2	3	4	5
Really, there's little you can do to prevent getting infected with HIV.	1	2	3	4	5
I believe I can tell which of my clients are infected with HIV.	1	2	3	4	5

Q - 21. Policies and Procedures about Sharps Injuries.
Please indicate whether your employer has a written policy for the following situations. (Please circle the appropriate response.)

YES NO UNSURE

1 2 3

Recapping of needles	1	2	3
The use of puncture-resistant sharps containers	1	2	3
The level of filling of sharps containers	1	2	3
Transporting sealed sharps containers from the client's home	1	2	3
Hepatitis B vaccination for staff	1	2	3
Reporting of sharps injuries during the day	1	2	3
Reporting of sharps injuries after dayshift or on weekends	1	2	3
Obtaining client consent for post-exposure blood sampling	1	2	3
Drawing blood promptly from the staff member who experiences a sharps injury	1	2	3

Q - 21. (continued)

	YES	NO	UNSURE
1	1	2	3
Drawing blood promptly from the client who is the source of the sharps injury (that is, the person from whom the injury was sustained)	1	2	3
Post-exposure counselling for the staff member who experiences a sharps injury	1	2	3
Post-exposure counselling for the client who is the source of the sharps injury (that is, the person from whom the injury was sustained)	1	2	3
Protocol for receiving hepatitis B immunoglobulin or other treatment if a sharps injury occurs	1	2	3

Q - 22. Does your employer have a written procedure for the reporting of sharps injuries? (Please check the appropriate response.)

- 1 YES
2 NO
3 UNCERTAIN
- (PLEASE PROCEED TO QUESTION 24)
-(PLEASE PROCEED TO QUESTION 24.)

Q - 23. What is the purpose of reporting sharps injuries in your organization? (Please check ALL that apply.)

- 1 FOR STATISTICAL PURPOSES
2 FOR WORKERS' COMPENSATION
3 FOR PERFORMANCE REVIEWS
4 FOR IMPROVED PREVENTION OF SHARPS INJURIES IN FUTURE
5 UNKNOWN

This last set of questions relates to your nursing education and work experience.

24. What year did you graduate from your basic nursing program?

YEAR OF GRADUATION

25. What is your highest level of education completed? (Please circle the number of your answer.)

- 1 RN DIPLOMA
2 DIPLOMA IN PUBLIC HEALTH
3 BACCALAUREATE DEGREE (NON-NURSING)
4 BACCALAUREATE DEGREE IN NURSING
5 MASTER'S DEGREE (NON-NURSING)
6 MASTER'S DEGREE IN NURSING
7 PHD

Q - 26. How many years have you worked in nursing (to the nearest year)?

YEARS

Q - 27. How many hours have you worked in home care in an average week during the past year?

HOURS

Thank you very much for taking the time to complete this questionnaire. Your participation is greatly appreciated and will enhance the findings of the survey. Please return the completed questionnaire in the enclosed envelope.

APPENDIX C: REMINDER LETTER

SHARPS INJURY STUDY

October 6, 1995

Dear Colleague,

I am writing to ask for your assistance with a questionnaire on sharps injuries in home care nurses in Alberta. If you have already completed and returned the questionnaire I previously sent to you, please discard this material. If you have not, I invite you to complete the questionnaire now.

I can foresee no risk to you in answering this questionnaire, unless it arouses unpleasant memories of previous sharps injuries you may have received. Your response will be anonymous. I will discuss the results in my thesis and will submit the findings for publication. However, I will discuss only grouped data and will not use any information that could identify individuals or specific organizations. The data will be kept in a locked cupboard for seven years and then destroyed.

There are no direct benefits to you by participating. However, one benefit that may result from the study is an understanding of the factors related to sharps injuries in the home care setting. This understanding may lead to the development of measures to prevent sharps injuries. Ultimately this would reduce the transmission of hepatitis B, hepatitis C, and human immunodeficiency virus in the workplace. Your response will contribute to the understanding of factors associated with sharps injuries. Please complete the attached questionnaire and return it to the Alberta Association of Registered Nurses in the enclosed, stamped envelope.

The questionnaire should take about 15 minutes to complete. **PLEASE DO NOT MARK YOUR NAME ON ANY PART OF THE QUESTIONNAIRE.** If you have any questions or concerns, please do not hesitate to call me at 427-2644 during working hours or 481-2379 after hours. You are welcome to contact the supervisor for my thesis. My supervisor is Dr. Linda Reutter, Associate Professor of Nursing; her telephone number at the Faculty of Nursing is 492-5909.

Thank you for considering my invitation to complete this questionnaire.

Sincerely,

Anita Hanrahan, RN BN
MN Candidate

10025 Jasper Avenue
Box 1360
Edmonton, Alberta
Canada T5J 2N3

November 23, 1994

Anita Hanrahan
31 Garipey Crescent
Edmonton, Alberta
T6M 1B5

Dear Anita:

RE: Questionnaire for Survey of Needlestick Injuries in Alberta

Sharon Snell passed along to me your request for permission to use or revise some of the questions that were used in the questionnaire for the survey of Needlestick Injuries in Alberta.

I am pleased to grant the requested permission. This is exactly what Sharon and I hoped would happen, i.e., that work carried out under the Premier's Nursing Initiatives would provide a basis for additional research.

Sharon and I both wish you all the best as you carry out your research. Welcome to JAB!

Sincerely,

Sharon T. Snell
Karen

Karen Titanich
Project Manager
Workforce Design Unit

cc: Sharon Snell

To: Anita Henderson

I give permission to Anita Hanrahan to use questions from the instrument developed for a national survey of health care workers in the United States. The survey was conducted to estimate compliance with infection control guidelines by workers in healthcare facilities. The results were published in an article entitled *Use of Infection Control Guidelines by Workers in Healthcare Facilities to Prevent Occupational Transmission of HBV and HIV: Results from a National Survey*.

I understand that Dr. Linda Martin and myself will receive credit for the questions used from my questionnaire that are used in Anita Hanrahan's study and discussed in her thesis as well as any subsequent publications.

I also request to receive one copy of any publication based on this research.

James C. Hersey PhD

Author

Battelle
210 Wilson Blvd

Arlington VA 22180

Good luck.

Also Rbgyr Geeshon of Johns Hopkins 410/955 3046
has been working on measures of safety climate that
may have relevance to your work.

Jim Hersey

FAX: 403/422-6663



**Notification of Ethical Acceptability for Research Involving
Human Subjects**

NAME OF APPLICANT(S): Anita C. Hanrahan, MN Candidate

TITLE OF PROJECT: "The Relationship Between Recapping, Disposal and Transportation of Used Sharps and Sharps Injuries Sustained by Home Care Nurses in Alberta"

Further to review by the Ethics Review Committee, their decision is as follows:

☒ Ethical approval is granted for a period of one year. Please notify the Chair, of any changes to the study protocol. (Comments noted, if applicable)

☐ *Ethical approval is granted pending response to the Chair/Reviewers.

☐ *Ethical approval is not yet granted: further response/discussion required by Committee.

☐ Ethical approval of resubmission of proposal with changes is granted (for a period of one year).

Comments:

*Please submit this information to the Chair of the Committee.

Jan. 23, 1995
Date

M. Ruth Elliott
M. Ruth Elliott, RN, PhD
Chair, Ethics Review Committee

The Ethics Review Committee is a Joint Committee of
The Faculty of Nursing, University of Alberta
and University of Alberta Hospitals

cc: L. Reutter



**Certification of Ethical Acceptability for Research Involving
Human Subjects**

NAME OF APPLICANT(S): Anita C. Hanrahan, MN Candidate

TITLE OF PROJECT: "The Relationship Between Recapping, Disposal and
Transportation of Used Sharps and Sharps Injuries
Sustained by Home Care Nurses in Alberta"

The members of the review committee, having examined the application for the above-named project, consider the procedures, as outlined by the applicant, to be acceptable on ethical grounds for research involving human subjects.

Jan. 23, 1995
Date

M. Ruth Elliott
M. Ruth Elliott, PhD
Chair
Ethics Review Committee

The Ethics Review Committee is a Joint Committee of
The Faculty of Nursing, University of Alberta
and the University of Alberta Hospitals